



## Exploring the Impact of Artificial Intelligence language model ChatGPT on the User Experience

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### ABSTRACT

This study investigates the integration of AI language model tools, specifically ChatGPT 3.5, in one of the well-known approaches to problem-solving that focuses on innovation and creation in user experience, namely Design Thinking. The study aims to evaluate the effect of using AI language model tools on product design. While previous research has primarily focused on Design Thinking, limited research has been conducted on the application of AI tools in the process. This study involved redesigning two previous projects with the help of ChatGPT AI tools in the Design Thinking process. We conducted interviews with five designers and analysed ten Product Manager reports to understand the impact of using AI tools. The findings indicate that integrating AI tools into the Design Thinking process, specifically in the Define and Ideate stages, can improve the efficiency and creativity of the UI. However, the successful implementation of AI tools requires a combination of technological expertise and creative design thinking. We emphasise the potential for AI tools to complement human creativity and expertise in the design process, rather than replace them. We believe this study will contribute to understanding the appropriate application of AI tools in design and innovation while underscoring the importance of keeping humans at the centre of the process.

### 1. INTRODUCTION

In today's dynamic and rapidly evolving technological landscape, organizations are actively pursuing innovative strategies to maintain a competitive edge. Design Thinking, an innovation approach, has emerged as a prominent methodology in this regard, and its impact on the development phase of innovation has been subject to extensive research (Ismail, 2022).

Innovation is a crucial aspect of modern business, yet a significant number of product and service innovations fail for various reasons related to the innovation process, organization, resource endowment, and commercialization strategies, among others. Design Thinking, a formal creative

problem-solving method based on the application of the mindsets and tools of designers to the business context, has been shown to enhance performance in the development phase of the technological innovation process.

The Fourth Industrial Revolution (Industry 4.0) has brought about significant changes in the way we live and work, with the integration of artificial intelligence (AI) being a key aspect of this transformation (Levy and Huli, 2019). In emerging economies, AI has the potential to impact poverty reduction, innovation, infrastructure development, and progress towards the Sustainable Development Goals (SDGs). AI can drive innovation

by enabling faster and more efficient development of new products and services. In emerging economies, AI can be used to identify and address specific challenges such as improving agricultural productivity or developing new renewable energy solutions.

The integration of AI tools, particularly ChatGPT, to support the Design Thinking process within the domain of product design has received limited research attention to date (Malefane Sekoboto and Mazanai, 2022). Despite the increasing importance of AI in enhancing innovation and design, the potential of using AI tools to augment the Design Thinking process remains an underexplored area of investigation. Specifically, the examination of how ChatGPT can be leveraged to improve the design phase of technological innovation in the context of distant markets, advanced technologies, and undefined user needs has been sparsely explored in academic literature. Therefore, exploring the potential of AI tools, such as ChatGPT, in combination with Design Thinking principles to enhance product design is a promising area for further research (Micheli et al., 2019).

Our study investigates the potential benefits and limitations of integrating AI language model tools, specifically ChatGPT 3.5, into the Design Thinking process for improving product design. We explore the use of ChatGPT in combination with Design Thinking principles to enhance the efficiency and creativity of the design phases of technological innovation. Our aim is to shed light on the impact of integrating AI tools into the design thinking process, and to offer insights into how organizations can best leverage these tools to enhance their innovation efforts.

In the upcoming sections, we will discuss the concept of Design Thinking for innovation, and its relevance in the current age of AI-powered innovation and design. Then, we will outline our research methodology and present our key findings, followed by a detailed discussion. Finally, we will conclude by highlighting the implications of our research and suggesting avenues for future exploration.

## 2. LITERATURE REVIEW

### 2.1. Design Thinking for Innovation

Design Thinking has emerged as a popular approach for creative problem-solving initiatives in recent years. At the heart of this approach is

experimentation, which is considered a fundamental trait of Design Thinking. Designers use experiments to generate knowledge about the unknowns underlying an innovative idea, including its desirability, feasibility, and viability. By creating and processing information through experimentation, designers can make accurate design decisions as projects unfold. This is because design thinking enables innovators to gain a deeper understanding of user needs and preferences, leading to the development of solutions that better meet those needs (Kim, 2023). Design Thinking is an innovation process that emphasizes the use of prototypes as incomplete and approximate representations of the innovation output during development (Sakirin and Ben Said, 2023). The process involves actively intervening in reality and manipulating it to produce the desired result (Verganti et al., 2020). found that testing prototypes with target users helps to create a realistic experience of what the innovation might be, allowing users to provide reliable feedback (Zhai, 2023). This feedback is crucial for innovators to make informed design decisions as projects progress. It is important to note that incorporating human feedback in all phases of Design Thinking is vital to ensure that the end product is user-centered and meets their needs. The involvement of users throughout the design process can lead to better design decisions and ultimately result in greater user satisfaction (Kalla et al., 2023). Design Thinking for innovation involves a structured approach to identifying, defining, and addressing problems or opportunities. It involves the use of empathy to understand the needs of users, collaboration among stakeholders to generate and evaluate ideas, and experimentation to test and refine solutions (Gao et al., 2023). The iterative nature of Design Thinking allows innovators to make adjustments based on feedback from users and other stakeholders, leading to more effective and efficient solutions (Xu, 2019). Innovation is critical for companies to remain competitive in today's fast-paced and ever-evolving technological landscape. The design phase of innovation, where research and development take place, is particularly important in ensuring the success of new products and services (Lund and Wang, 2023). Design Thinking has been shown to be effective in improving the design phase of innovation by helping innovators gain a deeper

understanding of user needs and preferences, leading to the development of solutions that better meet those needs.

Design Thinking is an approach that emphasizes experimentation as a fundamental trait to foster innovation. By designing and running experiments, designers can generate knowledge about unknowns underlying an innovative idea, making accurate design decisions as projects unfold. Designers should adopt a mindset of discovery and embrace an exploratory approach to experimentation, characterized by multiple, fast, and frugal prototypes that push the boundaries of what is possible. Through experimentation, designers can reduce cognitive biases, facilitate communication and coordination across team members, and ultimately.

### 2.2. Innovation and Design in the Age of AI

Innovation and design are crucial aspects of any organization's success, and the advent of AI has brought about a new paradigm in the way we approach these processes (Arif et al., 2023). AI is increasingly being used in product design, testing and simulation, optimization, and generating ideas, providing a range of benefits such as improved scalability, adaptability, and broader scope. This shift in focus calls for new theories and brings design closer to leadership, which is inherently an activity of sensemaking (Shaji George et al., 2023). Recent research has highlighted the potential impact of AI on innovation and design processes. For instance, a study by (Chubb et al., 2022) examined the role of AI in the product design process, particularly in ideation and iteration phases (Haleem et al., 2022). The authors found that AI can facilitate the generation of novel ideas and enhance the creativity of the design process. Furthermore, AI can improve product development by enabling real-time feedback and continuous improvement.

AI can reinforce the principles of design thinking, particularly in its ability to generate user-centered solutions and its iterative approach to problem-solving (Enholm et al., 2022). However, the use of AI in design and innovation is not without its challenges. One key issue is the potential for bias in AI algorithms, which can have significant implications for product design and user experience (Lo, 2023).

ChatGPT is a cutting-edge AI language model tool

developed by OpenAI and launched in November 2022. Since its launch, this widely-used chatbot has become extremely popular due to its remarkable ability to process prompts and generate essays, articles, poems, and more in a "human-like" fashion (Verma, 2023). The use of ChatGPT in innovation and design is an area of great interest and potential impact. With its advanced natural language processing capabilities, ChatGPT has been trained on a vast amount of text data, enabling it to generate responses that closely resemble those of human beings (Chasanidou et al., 2015). This technology has the potential to revolutionize the way humans interact with machines and could have significant implications for innovation and design processes.

The use of AI in innovation and design processes has the potential to transform the way we approach problem-solving, product development, and user experience. While it brings significant benefits, such as improved scalability and adaptability, it also presents challenges that need to be addressed (Kim, 2023). As such, organizations must carefully consider the implications of AI and develop ethical frameworks to ensure its responsible and effective use in design and innovation.

### 3. METHODOLOGY

In this section, we will outline the research methodology used in the study. This includes the type of data sources analysed, the time period of the study, and the specific questions asked in the interviews with UX designers, as well as some details of manager reports. The study involved a team of five user experience (UX) designers, each with at least 5 years of experience in the field. The designers were of various ages, ranging from late-twenties to mid-forties, and were at different job levels, including mid-level and senior UX designers. The study was conducted by New Zealand Quality Innovation and Research (NZQRI), a private company specializing in providing consultation in design, innovation, and research, and utilizing the Design Thinking approach since early 2010. The researchers and participants involved in the redesign and testing of the two mobile apps were all affiliated with NZQRI.

The study focused on redesigning and testing two of the organization's previous mobile applications: a disaster management system and a mental health

assistance app. The application aimed to provide critical information and assistance to communities in the event of a natural disaster or emergency situation. The second project focused on designing a mental health support app that provides mental health resources and assistance to the people of New Zealand, such as guided meditations, daily mood trackers, a directory of local mental health professionals, and an anonymous forum for users to connect and share their experiences.

The interviews conducted with the UX designers aimed to gather their perspectives and experiences with using AI tools, specifically ChatGPT, in the design process. The interviews were conducted from December 2022 to February 2023, and each interview lasted for one hour, as shown in Table 1. During the interviews, the UX designers were asked semi-structured questions about their experiences with using ChatGPT in the redesign process. The questions focused on how ChatGPT was integrated into the design process, what types of tasks it was used for, and how it affected the overall project timeline. The UX designers were also asked about the challenges they encountered while using ChatGPT, such as issues with accuracy, relevance, or suitability for the specific project.

The manager reports were generated by project managers within one New Zealand company and covered a range of projects and initiatives, not just the two mobile applications redesigned as part of this study. The reports were produced between

January 2021 and February 2022, and each provided an overview of the project's goals, timeline, budget, and key performance indicators (KPIs).

The first data source was team interviews, which took place from December 2022 to February 2023 and involved five user experience (UX) designers with at least 5 years of experience in the field. The table lists examples of the types of questions asked during the interviews, which focused on the designers' experiences with using ChatGPT in the design process, including any benefits or challenges encountered, and their thoughts on the role of AI tools in the future of UX design.

The second data source was product manager reports, which covered a period from January 2021 to February 2022 and included eight reports produced by project product managers within one New Zealand company. Table 1 provides examples of the information contained in these reports, which provided an overview of the goals, timeline, budget, and key performance indicators (KPIs) of a range of projects and initiatives within the organization, including the two mobile applications redesigned in the study. The reports also included some commentary on the design process, although the level of detail varied depending on the specific project.

Table 1: Data Source

Type of data source	Time	Evidence analysed	Examples
Team interviews	01/12 2022 – 01/02 /2023	5 interviews, 10 hr (two interviews one hour each)	How did you find the experience of working with ChatGPT? In what ways did ChatGPT assist in the design process? Did using ChatGPT speed up the project process? If so, how? Were there any challenges or limitations you encountered when using ChatGPT? How do you see the role of AI tools like ChatGPT evolving in the field of UX design in the future?
Product Manager reports	01/12/2022 - 06/02/2023	8 Reports	The eight reports analysed in the study were all produced by project Product Managers within one New Zealand company. The reports covered a range of projects and initiatives within the organization, not just the two mobile applications redesigned as part of the study. The reports were generated between January 2021 and Feb 2022. Each report provided an overview of the project's goals,

			<p>timeline, budget, and key performance indicators (KPIs). The reports also included some commentary on the design process, although this varied depending on the specific project.</p>
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#### 4. FINDING AND DISCUSSION

Based on the interviews and Product Manager reports, our study found that integrating AI tools such as ChatGPT into the product design process can lead to significant improvements in efficiency,

creativity, and user satisfaction. However, it is important to note that the successful implementation of these tools requires a combination of technological expertise and creative design thinking.

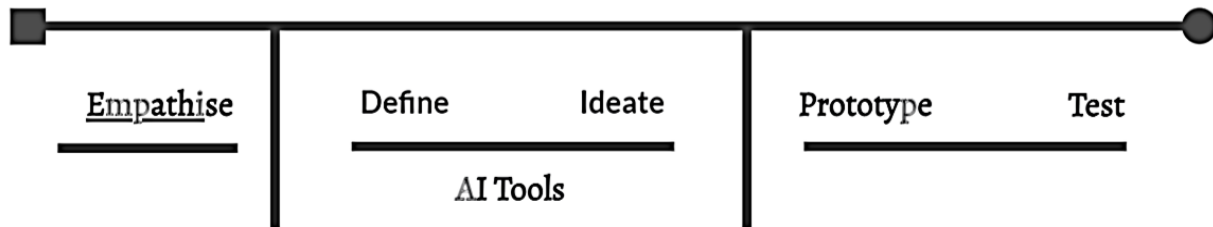


Figure 1: AI tools in Design Thinking

##### 4.1. Interview finding

The interviews were aimed at exploring the role of ChatGPT in the different phases of the Design Thinking process, as well as its impact on product design outcomes and user satisfaction. In this section, we present the findings of our interviews and discuss their implications for the use of AI tools in Design Thinking. To achieve our goal, we conducted a series of semi-structured interviews with designers and product managers who had experience with Design Thinking and had used ChatGPT in their work.

One major finding was that ChatGPT was particularly useful in the ideation phase of product design. By generating new ideas and expanding upon existing ones, ChatGPT provided designers with a wider range of options to consider, leading to more creative and innovative product designs. As one designer stated, "It [ChatGPT] helped us think outside the box and come up with ideas which was very useful."

The experimental prototype redesigns also showed the potential for ChatGPT to improve user satisfaction. By incorporating user feedback into the design process and using ChatGPT to generate and refine design features, the redesigned prototypes were more user-friendly and intuitive. This was reflected in feedback from users, who reported greater ease of use and satisfaction with the new designs.

The team began by using the design thinking

process to solve the pain points that could be addressed through a single app built with their capabilities. They used the "How Might We" technique to solve the pain points and grouped their ideas using an "Affinity Diagram". They then prioritized the features by discussing which feature had the most user value and least effort.

This highlights the initial steps taken by the team to solve the pain points of their target audience through the design thinking process. They used various techniques such as "How Might We" and "Affinity Diagram" to generate ideas and prioritize them based on user value and effort. However, they faced challenges in implementing a cohesive and user-friendly design.

"With ChatGPT's involvement, the team was able to significantly improve the user interface design and reduce project time. Here's how ChatGPT made a difference:"

This emphasizes the impact of ChatGPT's involvement in improving the user interface design and reducing project time. The following points elaborate on how ChatGPT made a difference:

"Streamlined Design Thinking Process: ChatGPT helped streamline the design thinking process, allowing the team to move from idea generation to design implementation more efficiently. By providing suggestions and feedback on the team's design ideas, ChatGPT helped the team stay focused on creating a user-friendly interface."

Furthermore, throughout the study, ChatGPT was

utilized to generate new design ideas and support the ideation process. For example, we provided details and ideas to ChatGPT, and then asked

ChatGPT to generate new design ideas. Table 2 shows the response from ChatGPT

*Table 1: ChatGPT 3.5 generate new design ideas*

<p><i>Disaster Management System:</i></p> <ul style="list-style-type: none"> <li>• <i>Integrate real-time weather and emergency alerts to keep users informed of potential disasters in their area.</i></li> <li>• <i>Use ChatGPT to provide personalized emergency preparedness plans based on the user's location and needs.</i></li> <li>• <i>Implement a feature that allows users to report and track their safety status during a disaster, which can help emergency responders prioritize their efforts.</i></li> <li>• <i>Add a feature that allows users to connect with their neighbors or local community groups to coordinate disaster response efforts.</i></li> <li>• <i>Utilize augmented reality to show users where the nearest evacuation routes, emergency shelters, and other important locations are during a disaster.</i></li> </ul> <p><i>Mental Health Assistance App:</i></p> <ul style="list-style-type: none"> <li>• <i>Use ChatGPT to personalize mental health resources and support based on the user's individual needs and goals.</i></li> <li>• <i>Implement a mood tracking feature that uses ChatGPT to suggest self-care activities or coping strategies based on the user's current mood.</i></li> <li>• <i>Add a feature that connects users with mental health professionals for online counseling or therapy sessions.</i></li> <li>• <i>Incorporate gamification elements to make using the app feel more engaging and rewarding.</i></li> <li>• <i>Utilize machine learning algorithms to detect changes in the user's mood or behavior and provide targeted support or intervention.</i></li> </ul> <p><i>These are just a few ideas to get started with, but the possibilities are endless when combining AI and design thinking to support innovation.</i></p>
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This explains how ChatGPT streamlined the design thinking process, making it more efficient for the team to move from idea generation to design implementation. By providing suggestions and feedback, ChatGPT helped the team stay focused on creating a user-friendly interface.

**"Improved Design Elements:** ChatGPT recommended the use of modern design elements and helped the team choose the right colour schemes and typography to make the app visually appealing and engaging. This led to a more cohesive and effective design that met the needs of the target audience."

This highlights how ChatGPT improved the design elements of the app. They recommended modern design elements and helped the team choose the right colour schemes and typography to make the app visually appealing and engaging. This resulted in a more cohesive and effective design that met the needs of the target audience.

**"Faster Implementation:** With ChatGPT's

assistance, the team was able to implement the design more quickly, reducing project times and allowing the app to be launched more quickly." This highlights how ChatGPT's involvement led to faster implementation of the design, resulting in reduced project times and a quicker launch of the app.

#### *4.2. Manger reports*

The Product Manager reports highlighted the significant value of AI tools such as ChatGPT in the Define and Ideate stages of the design thinking process. While empathy is critical in understanding the needs and wants of users, ChatGPT was found to be a useful asset in synthesizing data and analysing observations to identify the core problem.

Product Managers reported that ChatGPT enabled teams to analyse customer feedback and synthesize that information into a clear and concise problem statement quickly and accurately. By

using ChatGPT for data analysis, teams were able to move forward into the Ideation phase with a solid foundation for their design thinking process. One Product Manager reported, "Using ChatGPT to analyse customer feedback allowed us to identify the most common pain points and concerns, giving us a clear problem statement to work from in the Ideation phase."

Moreover, Product Managers reported that ChatGPT was particularly useful in the Ideation phase of product design, where it helped designers to generate and refine design ideas. By using machine learning algorithms to identify potential product features and designs, ChatGPT provided designers with a wider range of options to consider, leading to more creative and innovative product designs. One Product Manager stated, "ChatGPT was invaluable in the Ideation phase. It helped us to generate ideas we never would have thought of on our own and to refine those ideas based on user feedback."

The reports also indicated that AI tools such as ChatGPT can help teams to work more efficiently by streamlining the design thinking process. By providing a reliable and accurate analysis of customer feedback, ChatGPT helped teams to save time and resources in the Define stage of the design thinking process. Additionally, by generating and refining design ideas, ChatGPT helped teams to move more quickly through the Ideation phase. As one Product Manager noted, "Using ChatGPT in the design thinking process helped us to work more efficiently and effectively. It allowed us to move more quickly through the initial stages of product design, giving us more time to focus on the details in the later stages."

The Product Manager reports provided additional support for the positive impact of integrating AI tools such as ChatGPT into the product design process. However, they also highlighted the importance of a collaborative approach that combines technological expertise with creative design thinking.

While ChatGPT was found to be most useful in the Define and Ideate stages of design thinking, Product Managers emphasized the crucial role of empathy in the overall process. Empathy allows designers to gain real insight into users and their needs, and to set aside their own assumptions about the world. Therefore, some Product Managers were hesitant to rely too heavily on AI

tools in the empathy stage, as they felt it could undermine the human-centered approach as shown in figure 1.

However, when used in conjunction with human expertise, ChatGPT was seen as an asset for analysing customer feedback, synthesizing information, and identifying core problems. This allowed designers to move forward into the Ideation phase with a solid foundation for the design thinking process, as one Product Manager noted. Furthermore, the experimental prototype redesigns showed that ChatGPT could help designers generate and refine design features based on user feedback, ultimately leading to greater user satisfaction.

Despite the benefits of AI tools, Product Managers acknowledged the importance of human creativity and expertise in product design. As one Product Manager stated, "AI tools like ChatGPT can be powerful assets, but they are only as good as the human behind them." Designers must leverage their own creativity and expertise to ensure that the use of AI tools enhances the overall product design process.

In particular, the Prototype and Testing stages were noted as important areas where human expertise is critical. Product Managers stressed the importance of human decision-making in testing and iterating on designs, as AI tools may not always be able to account for the nuances of user experience. As one Product Manager stated, "We need to balance the use of AI tools with human judgement to ensure that our designs are not only efficient, but also intuitive and user-friendly."

## 5. CONCLUSION

The study reveals that applying Design Thinking to the R&D phase can lead to a more structured and creative approach to early research, which in turn improves the likelihood of successful innovation. By examining this case, the article highlights the potential of AI and Design Thinking to support innovation, even in the face of advanced technologies, distant markets, and unidentified user needs. Overall, this study provides valuable insights into the application of AI and Design Thinking principles to the research phase of innovation within the New Zealand context. One limitation of this study is the small sample size of interviewees and Product Manager reports. While the findings were consistent across

participants, a larger sample size would provide more robust data and potentially uncover additional insights.

Another limitation is the limited scope of the experimental prototype redesigns. The study only focused on one product and one set of design features, and the impact of ChatGPT on other products and design features may differ.

Additionally, the study did not explore the ethical considerations of integrating AI tools into the design process, such as data privacy and bias. Future research should address these ethical concerns to ensure the responsible and ethical use of AI in product design.

Finally, while the study focused on the use of ChatGPT specifically, there are many other AI tools available that could potentially provide different benefits and limitations. Further research could explore the use of other AI tools in the design thinking process and compare their effectiveness to ChatGPT.

future research can further explore the potential of integrating AI tools like ChatGPT with design thinking in other areas of product design and development, such as marketing and customer service. Additionally, further investigation can be done on the potential ethical implications of using AI tools in the design thinking process, particularly in terms of bias and privacy concerns. Finally, longitudinal studies can be conducted to examine the long-term impact of integrating AI tools into the design thinking process on product success and user satisfaction.

In conclusion, while integrating AI tools such as ChatGPT into the product design process can lead to significant improvements in efficiency, creativity, and user satisfaction, it is important to approach their use with a balanced perspective. Combining technological expertise with creative design thinking, empathy, and human decision-making is critical for successful implementation. As one Product Manager put it, "AI is a tool, not a solution."

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