

# Study on the Beneficial Impacts and Ethical Dimensions of Generative AI in Software Product Management

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**Abstract:** The field of generative artificial intelligence (GAI) has advanced significantly in recent years, and its effects may be seen across the software product management industry. This comprehensive literature review draws on relevant studies published between 2016 and 2023 and demonstrates the possible uses, advantages, and restrictions of generative AI in this domain. The research demonstrates that technology aids in ideation, market research, consumer insights, spec writing, and product development. By automating tasks like code production and analysing user input, it may cut down on expensive and time-consuming software development. However, there are still concerns about the precision and safety of the technology, as well as ethical implications. Practical applications of generative AI have the potential to greatly enhance software product management processes, leading to more effective use of resources, higher quality product results, and enhanced user experiences.

**Keywords:** *Generative AI, Product Manager, Product Management, AI Applications in Product Management, Applications of Generative AI, Generative AI Tools, Generative AI Limitations, Ethical Considerations*

## 1. Introduction

As DARPA (2023) classifies the transition between the second and third wave of AI advancement, generative AI stands as a witness to AI's revolutionary potential. While the first generation of AI relied on predetermined sets of rules and the second generation used machine learning and deep learning applications, the third generation of AI is expected to be able to adapt to new situations in a way that mimics human cognition. Between the two, generative AI makes use of deep learning frameworks like Generative Adversarial Networks (GANs) to produce original material like text, pictures, or music. As we learn more about this fascinating field, we open up enormous opportunities for technological revolution.

The term "generative AI" is used to describe machines

that can come up with completely original data, such as pictures, texts, or sounds. Learning from a vast quantity of input data and producing output that represents the patterns or characteristics found in that data is a common practise. OpenAI's conversational AI system ChatGPT and their creative visual AI DALL-E2 are just two examples of the ways in which major tech companies have piqued the interest of the general public in AIGC in recent years. These models have made great progress over the previous decade (Cao et al., 2023) thanks to the foundation of deep generative AI based on neural networks. The generative adversarial network (GAN) is the most well-known kind of generative AI. It consists of two neural networks that compete to produce good content. Variational autoencoders (VAE) and transformers, such as OpenAI's GPT-3, are further examples of generative AI systems that have shown particular expertise in creating human-like literary output (Radford et al., 2021).

Critical to the success of any software company, software product management is the coordination of all efforts related to developing, releasing, and supporting software. Software product managers that adhere to the standards established by the International Software Product Management Association (ISPM) are well-prepared to handle the challenges of product strategy, planning, development, and management. It is the goal of software product management to ensure that business goals and customer demands are in harmony, that product features are optimised, that requirements are prioritised, that cross-functional teams are coordinated, and that the whole product lifecycle is effectively

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managed. ISPMA offers a holistic framework that equips software product managers to drive innovation, facilitate collaboration, and achieve sustainable success in today's ever-evolving software industry (ISPMA, 2023) by placing a focus on user-centricity, value creation, and Agile approaches.

Market research, product analysis, product strategy, product planning, development, marketing, sales, and support and services are just a few of the many tasks involved in software product management. Understanding customer requirements, market trends, and technology advancements are all crucial to a successful software product manager's efforts. In the realm of software product management, generative artificial intelligence (GenAI) has emerged as a potentially useful tool that might improve decision-making and product quality. The purpose of this review is to provide a synopsis of the literature on the use of generative AI in software product management, with a particular emphasis on the role of the software product manager.

This article provides a comprehensive analysis of how generative AI may revolutionise the software product management industry and its many subfields. The next parts will talk about the literature review, the pros and cons of using generative AI in software product management, and how it all fits together.

### **Problem Statement**

In order to bring software product management into the twenty-first century, revolutionary generative AI has the ability to automate processes, increase efficiency, and improve the quality of the customer experience (Peng et al., 2023; Malik et al., 2022; Siggelkow & Terwiesch, 2023). The need for generative AI applications is projected to be driven by the growing need to modernise workflow across sectors. According to Grandviewresearch (2023), the worldwide market for generative AI would grow to \$109 billion by 2030. McKinsey & Company found that the majority of businesses that used AI saw an increase in revenue (67%) and a reduction in expenses (79%) within two years. The issue at hand is the widespread dearth of cutting-edge resources available to software product managers who want to boost productivity, revenue, and product quality. The particular issue is that software product management teams aren't aware of generative AI's potential. This research intends to fill that informational vacuum by exploring the ethical implications of using generative AI in software product management. It will enable product managers to make use of this technology, which might result in better goods overall.

## **2. Significance of the Study**

Numerous sectors have been drastically altered by the introduction and growth of generative AI, and software product management is no exception. Despite the widespread use of this technology in product management, there has been a dearth of research that examine its entire scope of effect and ethical issues. The purpose of this research is to fill this void.

This research is important because it may help shed light on the usefulness and function of generative AI in software product management from a more comprehensive perspective. The results of this study have important implications for the field of study as well as for business executives, software product managers, and IT companies.

Grand View Research forecasts that by 2030, the worldwide market for GenAI would be worth \$109 billion (Grandviewresearch, 2023). As GenAI becomes more integrated into company strategy and operations, it is essential to have a firm grasp on how to make the most of such tools. Increased labour efficiency, individualised customer experience, expedited research and development, and the birth of new business models are just few of the tangible advantages of generative AI in software product management that are elucidated by this study's qualitative results. Leaders at the forefront of their companies' adoption of GenAI will find these insights indispensable.

This study addresses the moral questions raised by generative AI and provides recommendations for incorporating ethical considerations into AI tactics. This study bridges the gap between academic study and real-world application by adding to the conversation on GenAI and its effects on software product management. As a result, the corpus of knowledge in the area of applied research grows, opening the door to new avenues of investigation and growth.

Businesses and software developers may use the findings of this research to develop more effective AI strategies, which in turn will benefit their operations, their products, and their customers. These results also have the potential to spark debate and inform policymaking about the ethical use of AI, therefore aiding in the development of this technology in a responsible manner.

Simply said, both academics and business will benefit greatly from this investigation into the use of generative AI in software product management. Its ramifications have the potential to spur creativity, improve company operations, and guide ethical decisions about the use of AI.

### 3. Literature Review

This study draws on a thorough examination of previously published research on the use of generative AI in corporate and product management. Applications in product management are studied using the ISPMA (2023) framework. A well-known framework developed expressly for software product management is the ISPMA Product Management Framework. The ISPMA Product Management Framework is the recommended framework according to Paajoki (2020). Targeted at key application areas like market research, product planning, product documentation, product requirements engineering, product development, UI/UX design, customer insights, and Agile software development, this review seeks to identify and synthesise the current state of research in these areas. Reviewing how an organisation may adapt this technological shift using the McKinsey 7-S Framework and Lewin's shift Model provides a solid platform for product managers and business executives to make the most of this innovation (Peters & Waterman, 1984; Lewin, 1947). The topic of ethics and privacy is guided by the Responsible Innovation framework developed by Owen et al. (2013) and the principles of the General Data Protection Regulation (2023).

#### 3.1 Relevant Studies in the Software Product Management

##### Idea Generation

Karim et al. (2022) studied the potential of generative AI for use in creative tasks like brainstorming and coming up with leads in scientific inquiry. Their approach expands on an existing framework for the generation of COVID-19-related medical discussions. The authors used the GPT-NEO-125M and GPT-NEO-1.3B models, both of which are based on GPT3. Ideas were more consistent and well-connected in the bigger GPT-NEO-1.3B model. They say that the ideas drawn from their results may be applied to other scientific or specialised domains, even though their research concentrated on the medical domain (and especially COVID-19). The results reveal that the more comprehensive model produces more unified writing that naturally flows from thought to idea.

##### Market Research

Artificial intelligence (AI) developed to comprehend and produce natural-sounding language is known as a Large Language Model (LLM). The studies conducted by Brand et al. (2023) showed the usefulness of these models in deducing consumer preferences. They discovered that when GPT is given the role of a hypothetical client chosen at random, it displays reactions that are plausible and in line with values

derived from prior studies. Although LLMs use conventional market research methods to demonstrate the value of GPT, they have the potential to spark the development of innovative market research techniques that do not involve human participants. The authors included a disclaimer that LLMs might "hallucinate" and provide false results on occasion.

##### Customer Insights

The revolutionary potential of huge language models like OpenAI's ChatGPT and Google's Bard to improve customer experiences was highlighted by Siggelkow and Terwiesch (2023). They emphasised the ways in which these AI models may help in customer need recognition by analysing and integrating data, converting requirements into requests, and providing individualised responses. They stressed the need to put the consumer first rather than the technology, suggesting that businesses use artificial intelligence to alleviate existing problems for their clientele rather than create new ones.

Siggelkow and Terwiesch (2023) have emphasised the significance of the 'repeat' component in customer contacts, whereby businesses gain insight from previous encounters to enhance future replies. Generative AI systems are particularly well-suited to this task, since they may provide a positive feedback loop to improve AI's knowledge of the consumer and so provide better, more tailored service. AI shouldn't be considered as a replacement for human workers, the authors said, but rather as a tool to augment a company's strengths in novel ways. The authors concluded that although generative AI has the ability to revolutionise consumer experiences, it must be used strategically to meet the demands of customers and strengthen a company's unique selling offer.

In their study of 5,179 customer service agents, Brynjolfsson et al. (2023) found that the use of a generative AI conversational assistant significantly improved worker productivity, boosted customer sentiment, and reduced staff turnover. The AI tool greatly enhanced issue resolution and customer satisfaction, especially for newer and less-skilled professionals, but did not significantly aid the highest-skilled or most-experienced staff. Agent interaction text analysis led researchers to conclude that AI advice helped train low-skilled people to talk like high-skilled ones.

##### Product Requirements Engineering

Requirement Engineering (RE) is a crucial part of software development that entails identifying, documenting, and managing software requirements, and it was the primary emphasis of Malik et al. (2022). They brought up the challenges that arise from ambiguities and

disagreements in Software Requirement Specifications (SRS), which are crucial deliverables in the software development life cycle. In order to address this problem, they presented a two-stage technique for automated conflict identification in SRS papers that integrates seamlessly with natural language specifications. In the first stage, we use transformer-based language embeddings to convert software requirements into numerical vectors; we next use cosine similarity and ROC curves to spot any inconsistencies. Potential conflicts are then analysed using both generic and software-specific Named Entity Recognition (NER), and the final collection of conflicts is determined by calculating the overlap between the entities involved. Results on the OpenCoss and IBM-UAV datasets showed an increase in F1-score of 4% and 5%, respectively, demonstrating its efficacy.

### **Agile Software Development**

For example, generative AI may help with estimate, backlog management, and planning sprints in Agile software development. Using natural language processing methods to analyse and estimate the work necessary for user stories, Kim et al. (2021) suggested an AI-driven strategy for calculating user story points in Agile projects.

Using a GPT-2 pre-trained language model and Transformer-based architecture, Fu and Tantithamthavorn (2022) presented GPT2SP, a novel Agile story point estimate technique. Planning Poker, analogy, and expert judgement are all inferior to the suggested method, as is the Deep-SE method, which is based on deep learning. In experiments including more than 23,000 bugs across 16 open-source projects, GPT2SP proved to be more accurate than its competitors by margins of 34%-57% within projects, 39%-49% across projects, and 6%-47% relative to Deep-SE. To further define the variables that affect the estimations, a proof-of-concept tool was created. The difficulty of estimating narrative points was noted in a study of working professionals. GPT2SP, an AI-based method that provides explanations, was similarly found to be more beneficial and credible.

Dam et al. (2019) presented a framework that may be used to enhance Agile project management by adapting and integrating different artificial intelligence technologies. Their suggested analytics engine intends to give decision assistance across numerous fronts, even if certain elements of Agile project management remain difficult owing to a lack of proper support. Most current Agile project management solutions contain some kind of descriptive analytics, a more fundamental form of analytics, notably via the visualisation of data in the form of reports, dashboards, and scorecards.

### **Automated Code Generation**

Although there are many studies on code generation using generative AI techniques like Transformer, Peng et al. (2023) found that GitHub Copilot, an AI pair programmer that makes suggestions based on context, significantly increases productivity. The research found that the Copilot group was 55.8% more productive than the control group, making it the first of its type to give empirical proof of the potential of AI technologies to boost human productivity. A hypothetical improvement in productivity of 55.8 percent has the potential to significantly impact GDP growth by reducing economic expenditures.

Automating Software Engineering (SE) documentation through the Generative Pre-trained Transformer-3 (GPT-3) Codex was investigated by Khan and Uddin (2022). Codex's average BLEU score of 20.63 under default circumstances exhibits state-of-the-art performance, exceeding previous models. Codex was effective because it used one-shot learning, a technique studied by randomly picking one sample from the matching training set, rather than retraining or fine-tuning for each individual task or language.

In order to enhance software development source code understanding, Park et al. (2023) presented the creation and assessment of the ALSI-Transformer, a transformer-based code comment generating model. The ALSI-Transformer employs an innovative approach to multimodal information aggregation through Gate Network in order to meet the growing need for fast code commenting in open-source software.

### **UI/UX Design**

Artificial intelligence (AI) is changing the way user research, design, and assessment are conducted in the HCI and UX fields (Xu, 2023) in revolutionary ways. Increased user awareness of technological advancement drives increased adoption of AI-based solutions that improve UX quality.

Houde et al. (2022) examined three application modernisation initiatives to learn more about the motivations, roadblocks, and operational practises of modernization teams. According to the authors' research, updating the user interface (UI) is a time-consuming and laborious procedure that requires a wide range of specialists (including project managers, UI designers, and software engineers) to complete a variety of individual jobs. Despite the importance of UX, it is frequently neglected in favour of other activities, such as refactoring the core code into microservices. However, the authors saw it as a viable path towards the introduction of generative AI systems. They identified problems with the current approach to UX modernisation

and suggested that generative AI models could be able to help. They also foresaw a future in which these models will be used to rethink UX upgrading processes.

### 3.2 Relevant Studies in Ethics and Privacy

The issue of "hallucinations" and inaccurate information returns was brought to light by Brand et al. (2023) about Large Language Models. Maintaining confidence in the correctness of AI-generated output calls for regular human checks.

Complex models have emerged as the use of deep generative AI models has grown in popularity. However, they are very dependent on high-quality training data in order to function well. It's important to note that these models often suffer from the 'black box' problem, which reduces their interpretability and introduces trust concerns. Finally, dealing with AI-generated

Cao et al. (2023) stress the need of material addressing crucial social topics to promote responsible and beneficial use for society.

The legal dangers associated with generative AI include the possible violation of intellectual property rights and the lack of clarity around issues like ownership and the applicability of copyright, patent, and trademark laws to AI-generated work. Businesses need to be aware of these dangers before they can use generative AI to its full potential. Updates to vendor and client contracts, including intellectual property protection provisions, and clear disclosure of the usage of generative AI, are crucial steps. To prevent the disclosure of sensitive information in AI tool text prompts, privacy protections should be tightened (Appel et al., 2023).

The advent of generative AI like ChatGPT raises numerous significant issues, as addressed by Dwivedi et al. (2023). Because these AI models cannot comprehend or account for ethical and legal considerations, they raise grave ethical problems. Because of this, it's possible that deepfakes and other forms of deception might be created. Problems with AI's explainability and transparency arise from its 'black box' character. The training data might inadvertently spread bias and false information. The lack of defined norms for AI development, hazy copyright borders, and questionable ownership of AI-generated material all provide significant legal challenges. As a result of implementing AI, the authors predict employment losses and a greater reliance on technology, both of which might stifle individual growth and leave businesses exposed if the technology fails. Another drawback of generative AI systems is that they can only add to or combine data that already exists. An emerging digital gap may result from the public's varying degrees of comfort with AI. Finally, the capacity to build effective prompts is essential for making good use of

generative AI, which may call for extensive training in new skills.

### 3.3 Relevant Studies in Business and Management

According to Korzynski et al. (2023), generative AI may help overcome the limited rationality model-defined shortcomings of human decision-making in business and management settings. Herbert Simon's (Simon, 1987) model underlines the limits of human cognition, the limitations of available knowledge, and the time restrictions that prevent us from making fully informed judgements. Optimisation theory and procedural rationality may benefit from the use of evolutionary algorithms and generative AI, made possible by developments in information technology. ChatGPT is only one example of a generative AI system that may give decision-makers with organised, logical data to help them better select and organise available possibilities. Age and gender are also mentioned as demographic parameters that affect whether or not generative AI is used in decision-making and how often. Users under the age of 30 are more likely to embrace new technologies and be receptive to employing AI tools, whereas users above the age of 30 may depend more heavily on their prior experience. Another factor is gender; research shows that males are often more interested in cutting-edge gadgets.

According to Korzynski et al. (2023), the rise of generative AI like ChatGPT is drastically altering the customer service industry and forcing experts to rethink their approaches. Direct consumer interaction is one way in which AI has the potential to transform service delivery and business-to-client relationships. Theorists of relationship marketing should take note, as AI's capacity for speed and personalization in responding to customers' inquiries might strengthen existing ties and win their allegiance. Furthermore, generative AI may boost customer happiness and provide credence to the assumption notion by giving customers a larger voice in their interactions with businesses. Finally, generative AI provides novel approaches to providing excellent experiences and fostering consumer engagement within the framework of customer experience management theory. However, further study is needed to determine the connection between generative AI services, customer engagement, customer loyalty, and the development of new value for businesses.

## 4. Review Questions

Petticrew and Roberts' (2005) framework of population, intervention, comparison, result, and context was used to classify the study topics. The target audience consists of software company product managers and executives. There was interference between generative AI and the job of organisation and product managers. The end result

is a discussion of how generative AI may be used and how it should be used ethically in the context of software product management. Companies producing software is the setting. No comparisons were included in the research. The qualitative study revolved on the following research topics (see Table 1).

“Table 1 Research Questions and Motivation

Research questions	Motivation
1. What are the applications of generative AI in software product management?	The research investigates the application of generative AI in software product management. It also aims to contribute to a deeper understanding of the role of generative AI in software product management and to identify potential areas for further research and development. The research results may assist software product managers wishing to leverage generative AI to improve their products and services.
2. What are the ethical challenges presented by Generative AI and what strategies can be employed to mitigate these issues?	Generative AI, with its potential to revolutionize business operations through increased automation, improved efficiency, and rapid decision-making, offers an array of benefits. Yet, as with any transformative technology, it brings with it a raft of ethical implications. These include concerns related to bias, transparency, data privacy, and potential misuse of AI-generated content, which, if left unaddressed, could potentially overshadow generative AI’s benefits. This requires a comprehensive exploration of the holistic impact of generative AI on businesses, one that not only delves into its benefits but also grapples with the ethical difficulties arising from its use. By addressing this research question, we aim to shed light on the path businesses must navigate to

	successfully harness the potential of generative AI while remaining ethically compliant and
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## 5. Review Methods

This qualitative descriptive research used data gathered from a literature review. We create modern applications of generative AI in software product management by drawing on existing and future research on product management subjects.

### 5.1 Data Source and Search Strategy

Searches were conducted using a combination of Google Scholar, EBSCOhost, ProQuest Central, and other major databases such as IEEE Xplore and the ACM Digital Library. Many various permutations of the terms "generative AI," "software product management," "Idea Generation," "Product Design," "Customer Insights," "Project Planning," "Automated Code Generation," "UI/UX Design," "Ethics," and "Customer Feedback Analysis" were used to locate relevant research.

### 5.2 Study Selection

The inclusion/exclusion criteria used by each data source are unique. The lack of a full-text search and the inability to specify the kind of source used are two examples. There are no well-read periodicals, dailies, or online pieces included. Full-text articles, papers from conferences, and IEEE standards may all be found in IEEE Xplore. Similarly, the search options available to you depend on the kind of data source you're using. The inclusion and exclusion criteria for each data source are listed in Table 2. The time frame for this project was from 2016 to 2023, and it required using only English-language sources and full-text documents.

**Table 2** Database Sources and Inclusion/Exclusion Criteria

No.	Source	Search criteria (inclusion/exclusion)
1	Google Scholar	Inclusion: the years 2016–2023; any type
2	ACM Digital Library	Inclusion: The ACM Full-Text collection; the years 2016–2023
3	EBSCOhost	Inclusion: Full text; peer-reviewed, the years 2016–2023 Exclusion: Magazines, trade publications
4	IEEE Xplore	Inclusion: the years 2016–2023
5	ProQuest Central	Inclusion: Full text, peer-reviewed, the years 2016–2023 Exclusion: Source type: blogs, podcasts, & websites; trade journals, <u>wire feeds, newspapers, magazines</u>

**5.3 Data Extraction and Data Synthesis**

**Applications of GenAI in Software Product Management**

Figure 1 shows the results of applying the ISPMA

framework to the synthesis. To better understand where generative AI may be applied inside the software product management framework, we identified applications of generative AI in software product management and linked them with ISPMA categories based on our literature analysis.

**Table 3** Applications of Generative AI with ISPMA Framework

Strategic Management	Product Strategy	Product Planning	Development	Marketing	Sales & Fulfillment	Delivery Service & Support
Corporate Strategy	Positioning & Product Definition	Customer Insight	Product Architecture and Management	Marketing Planning	Sales Planning	Service Planning and Preparation
Portfolio Management	Delivery Model & Service Strategy	Product Life Cycle Management	Development Environment Management	Value Communication	Customer Relationship Management	Service Execution
Innovation Management	Ecosystem Management	Roadmapping	Development Execution	Product Launches	Operational Sales	Technical Support
Resource Management	Sourcing	Release Planning	User Experience Design	Opportunity Management	Operational Fulfillment	Operations
Compliance Management	Pricing	Product Requirements Engineering	Detailed Requirements Engineering	Channel Preparation		
Market Analysis	Financial Management		Quality Management	Operational Marketing		

Product Analysis	Legal and IPR Management					
	Performance & Risk Management					

Note. The light blue cells show the applications of generative AI in the SPM category.”

Even though it's cutting edge now, generative AI is still developing. One of its most important applications is human-like content generation, which can be used in any scenario that calls for content creation (like product or technical documentation) or human-like conversations (like automated customer support), with the goal of giving customers answers that sound more reasonable and informative.

**Market Analysis.** Many different types of research and analysis fall under the umbrella of SPM's "market analysis" category. It is too soon to use GenAI in anything at this point. With the current body of scientific understanding, technology can only be of assistance. It can't replace the Product Manager in doing primary research—like conducting interviews with customers—but it might assist analyse consumer input and save down on analysis time. Karim et al. (2022) studied the potential of generative AI for use in creative tasks like brainstorming and coming up with leads in scientific inquiry. According to the findings, GenAI is able to produce logical and interrelated concepts from a given body of information. The research was conducted in the medical profession, however the findings are applicable to any field (Karim et al., 2022).

**Positioning and Product Definition.** GenAI's core use case is content authoring, therefore it can also help with this. Product definitions, such as name, feature writing, and suggestion, may be generated using the data from the market and the product analysis. The findings of the study by Nguyen et al. (2021) provide hope for improving the quality of product descriptions for online retailers. However, it is applicable in any field. Similar studies on the creation of product names were conducted by Zhang et al. (2022).

**Customer Insight and Support.** One of the most important applications of GenAI technology is in customer insight, where it can be used to learn from and improve future answers to customers based on their specific wants and requirements. The market for chatbots powered by GenAI has seen meteoric growth. Statista (2023) predicts that by 2025, the chatbot industry will be worth around \$1.25 billion, which is a huge rise from 2016's market value of \$190 million. Brynjolfsson et al.

(2023) found that a generative AI conversational assistant improved customer support efficiency, customer happiness, and staff retention, especially for less experienced employees.

**Product Requirements Engineering and Detailed Requirements Engineering.** Other applications of GenAI that support PMs with documentation, such as drafting and estimating Agile stories (Kim et al., 2021; Fu and Tantithamthavorn, 2022), include the following. Organisations or product managers may submit data about their products into a GenAI platform (like OpenAI GPT API) for training, thanks to the tremendous power of Reinforcement Learning with Human Feedback (RLHF). As the product owner, you may use this tool to improve your product expertise and documentation by, for example, crafting Agile stories. Any member of the company or product team may utilise the conversational AI tool to learn more about the company's products. Product managers may use the GenAI tool to get fresh ideas for product positioning by training it with information on rivals' goods, qualities, price, website content, etc. As an added bonus, it may be used to create attention-grabbing names for products. It's not limited to online stores, since Zhang et al. (2022) presented a technique to produce names for products generally.

**User Experience Design.** To improve user engagement and happiness, UX designers now have access to cutting-edge technologies made possible by generative artificial intelligence (AI). In order to facilitate quick development and testing, generative AI makes use of powerful machine-learning models like GANs to generate several design variants. In addition, it enables unique interactions by customising user interfaces to each individual. In addition to providing more intuitive and responsive designs, its ability to perceive and interpret context allows it to anticipate and answer user demands. To that end, generative AI opens the way for UX design that is more dynamic, adaptable, and focused on the user (Xu, 2023; Houde et al., 2022).

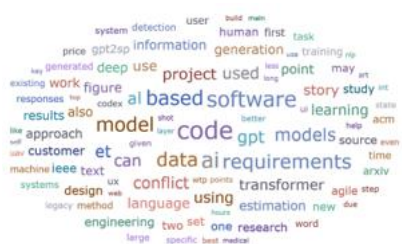
**Development Execution** is another important field where GenAI is seeing widespread use. Researchers were very interested in automatic code creation. The greatest number of words utilised in the included research is shown in Figure 2 below. Several models of GenAI have been made available for autonomous code generation. One of the most well-known platforms that offers a



GenAI plugin to automatically create code is GitHub. The Copilot group was 55.8% more productive, according to the research of Peng et al. (2023).

The majority of the code in a six-week pilot trial at Deloitte involving 55 developers was derived from Codex, and its correctness was judged by its users as 65% or higher. Deloitte conducted an experiment and discovered that time spent writing code for relevant tasks increased by 20% (Davenport & Mittal, 2022).

**Fig 1** Word Cloud of the Literature Review



### Ethical Implications of Generative AI

The ethical ramifications of generative AI must be taken into account as the technology gains in popularity. The potential for abuse of created material, data privacy, accountability, and bias in AI are all causes for worry (Brand et al., 2023; Cao et al., 2023; Appel et al., 2023; Dwivedi et al., 2023). In order to secure the ethical use of generative AI, it is crucial to create comprehensive ethical norms and regulatory mechanisms.

The principles of the General Data Protection Regulation (GDPR, 2023) and the Responsible Innovation Framework (Owen et al., 2013) guide the topic of ethics and privacy.

**Responsible Innovation Framework.** To guarantee a fair and moral approach to the creation and use of new technologies, Owen et al. (2013) introduced the Responsible Innovation (RI) framework, often known as the AREA framework. There are four parts to it: prescience, introspection, inclusiveness, and response.

**Anticipation.** Increased automation, more efficiency, and quicker decision-making are just some of the ways in which generative AI has the potential to revolutionise software product management. Developers and managers may plan for and execute GenAI methods that make the most of these benefits if they anticipate and account for them. However, foresight also has to take into account integration difficulties, ethical problems including bias and transparency, and doubts about the quality and accuracy of outputs. Consideration must be given in advance to the possibility of legal repercussions, such as intellectual property rights violations. This preventative method can lessen the likelihood of problems in the future by ensuring that protections are included in the system from the start.

**Reflexivity.** Engineers working on GenAI should be open to introspective self-analysis. Constantly evaluating the quality and accuracy of AI-generated outputs, they should investigate the decision-making processes around the employment of GenAI. To remedy any cases of "hallucination" or inaccurate information, human assessment of AI outputs will be necessary for reflexivity. Consideration of the 'black box' dilemma and its associated concerns—including trust and interpretability—is also warranted here.

**Inclusion.** When creating generative AI, it's important to get feedback from a wide variety of people. This may assist guarantee that the AI system is accommodating to a wide range of users by addressing problems like fairness, accountability, and workflow integration. Involving legal specialists who can advise on preserving intellectual property rights and manage any legal difficulties produced by AI-generated material is also a possible benefit.

**Responsiveness.** In the context of GenAI, responsiveness would include being open to change and quick to address new challenges as they arise. Refining AI algorithms to boost output quality, modifying processes to better incorporate AI into current workflows, or modifying practises to address ethical problems are all examples of what this may entail. When it comes to the law, responsiveness might include doing things like amending contracts and rules in light of new AI and intellectual property rights legislation.

By using the RI framework to GenAI, we can make sure that the advantages and risks of this cutting-edge technology are carefully weighed before it is deployed. Ethical and legal considerations may be taken into account in its use. This method may be useful in maximising the advantages of GenAI while minimising its drawbacks.

**General Data Protection Regulation (GDPR).** The General Data Protection Regulation (GDPR) was enacted to safeguard people's right to privacy and control over their own data inside the European Union. It includes detailed regulations for data gathering, archiving, and application. With the advent of generative AI and the massive amounts of data needed to train such systems, the importance of GDPR cannot be overstated. In particular, the ideas of GDPR may be applied to the pros and cons of Generative AI.

## 6. Results

Generative artificial intelligence (AI) has shown promise in several areas of software product management, including market research, product positioning and definition, customer research and service, product requirements engineering, and development and

deployment.

According to research, large language models like GPT-3 can do things like generate more cohesive and interconnected ideas, design user interfaces that stand out from the crowd, automatically estimate user story points, expand on code written in natural language, and analyse customer feedback. Managers may now better understand and manage product needs with less human work thanks to the automation of requirement elicitation and analysis and software documentation made possible by generative AI. And by using massive language models, generative AI might completely change the face of market research in the future (2023; Brand et al.).

When it comes to managing software products, generative AI has a wide variety of uses, from ideation

through distribution. Software product managers may save time, increase accuracy, and cut down on bugs by putting generative AI models to work for them. Better product outcomes, streamlined workflows, and more efficient use of resources across all stages of product development are all possible with the help of generative AI in software product management (Karim et al., 2022; Houde et al., 2022; Siggelkow & Terwiesch, 2023; Kim et al., 2021; Fu & Tantithamthavorn, 2022; Dam et al., 2019).

Research Question 1: What are the applications of generative AI in software product management?

The first research question is addressed by Table 3, which provides a summary of the uses of generative AI in software product management.

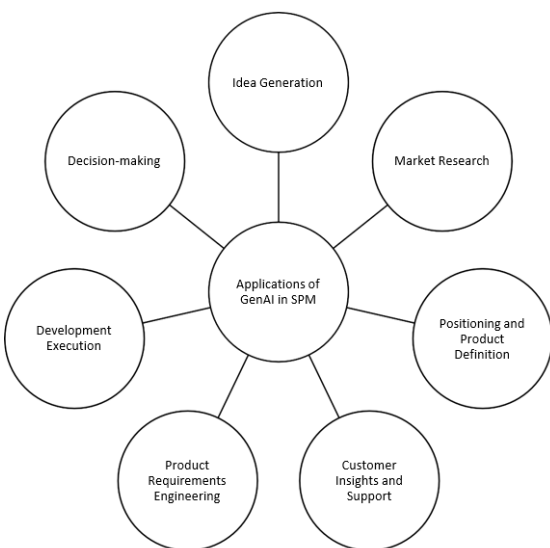
**Table 4** Applications of Generative AI in Software Product Management

No.	Application	Summary	Reference
1	Market Research	Generative AI models such as GPT can be used in market research, acting as hypothetical customers to understand preferences. Models such as these could inspire new research paradigms unrestricted by human subject research.	Brand et al., 2023
		Generative AI can generate ideas and brainstorm in specialized disciplines, with larger models generating more coherent and interconnected ideas.	Karim et al., 2022
2	Positioning and Product Definition	GenAI, primarily used for content writing, can aid in product positioning and definition, including naming and feature suggestions, with demonstrated efficacy in writing e-commerce product descriptions and title generation across various industries.	Nguyen et al., 2021 Zhang et al., 2022
3	Customer Insights, Customer Support	Generative AI models such as ChatGPT and Google's Bard can enhance customer experiences by interpreting and integrating data, translating needs into requests, and responding with tailored solutions. They can also analyze large volumes of customer feedback data to extract valuable insights. Additionally, generative AI can create a positive feedback loop, enhancing an understanding of the customer for more personalized service.	Siggelkow and Terwiesch, 2023
4	Product Requirements	Generative AI can automate requirement elicitation and analysis, generating natural language requirement statements from structured data. Also, it can help detect	Malik et al., 2022

	Engineering	conflicts in Software  Requirement Specifications (SRS) documents.	
		Generative AI can support sprint planning, backlog management, and estimation in Agile software development. AI models such as GPT-3 can automatically generate user stories based on  provided input data, saving time, reducing human error, and improving the quality of user stories.	Kim et al., 2021; Fu and Tantithamthavorn, 2022
5	Development Execution	Generative AI can aid in automated code generation, enhancing productivity and efficiency. Tools such as GitHub Copilot have demonstrated a significant boost in productivity. Furthermore, generative AI can be used to automate documentation generation and improve the comprehension of source code in software development.  Generative AI can create visually appealing and unique interfaces, streamlining the design process and enabling rapid prototyping. It can generate UI/UX designs based on user preferences and requirements, leading to more user-centric designs and improved product experiences.	Peng et al., 2023; Khan and Uddin, 2022; Park et al., 2023; Houde et al., 2022
6	Decision-making	Generative AI can enhance decision-making in business by addressing limitations of the bounded rationality model, with younger users and males typically more open to this  _____ technology's adoption.	Korzynski et al., 2023

Figure 2 illustrates the applications of generative AI in SPM.

**Fig 2** Applications of Generative AI in Software Product Management



**Research Question 2:** What are the ethical challenges presented by Generative AI and what strategies can be

employed to mitigate these issues?"

**Ethical Implications**

Generative artificial intelligence (GenAI) has a wide range of potential negative consequences, which highlights the need for strict standards and regulatory measures to guarantee its responsible use (Brand et al., 2023; Cao et al., 2023; Appel et al., 2023; Dwivedi et al., 2023) (all cited in Brand et al., 2023).

Fairness. The danger of bias in GenAI systems is real. Using biased training data might cause the AI system to provide biased or prejudiced results (Brand et al., 2023) accidentally. In order to prevent any kind of prejudice or injury, it is crucial to use varied and fair training data.

The confidentiality of personal data is another important ethical factor. Since GenAI systems need a lot of data to learn, there's a greater chance of privacy breaches. Data privacy may be protected by following privacy legislation like the General Data Protection Regulation (GDPR) (2023). When it comes to the ethical use of personal data for GenAI, firms may look to the principles outlined in GDPR (GDPR, 2023) for guidance.

Accountability. In the context of GenAI, accountability is accepting ownership of the results produced by the system. Organisations are responsible for fixing AI systems that produce inappropriate or erroneous material and preventing it from happening again (Cao et al., 2023) if this occurs.

Transparency. Another major issue is the potential for inappropriate usage of material created by GenAI. The ramifications of fake or tampered material being passed off as real in industries like news and journalism, as well as in financial reports and legal papers, are significant (Appel et al., 2023) [citation needed]. Preventing such abuse requires rigorous verification techniques. Complex models are the result of the proliferation of deep generative AI models. However, they are very dependent on high-quality training data in order to function well. A notable difficulty with these models is that they often suffer from the 'black box' problem, which reduces their interpretability and may lead to trust concerns (Cao et al., 2023) if not addressed.

Robustness. The issue of "hallucinations" and inaccurate information returns was brought to light by Brand et al. (2023) in reference to big language models. To assure the quality of the AI-generated output, human assessments must be performed on a regular basis.

Legal Dangers. The legal dangers associated with generative AI include the possible violation of intellectual property rights and the lack of clarity around issues like ownership and the applicability of copyright, patent, and trademark laws to AI-generated work. Businesses need to be aware of these dangers before they can use generative AI to its full potential. Updates to vendor and client contracts, including intellectual property protection provisions, and clear disclosure of the usage of generative AI, are crucial steps. To prevent the disclosure of sensitive information in AI tool text prompts, privacy protections should be tightened (Appel et al., 2023).

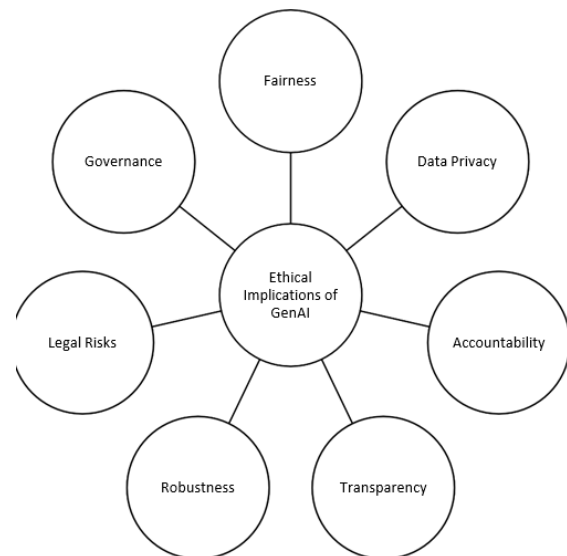
To deal with these moral concerns, Owen et al. (2013) presented the Responsible Innovation (RI) framework. To facilitate the well-rounded advancement and deployment of GenAI, the framework promotes foresight, reflexivity, inclusivity, and responsiveness. When properly implemented, the General Data Protection Regulation (GDPR) and the RI principles may aid in minimising these moral concerns and directing the ethical use of GenAI.

Yet regulatory difficulties continue. According to Hacker et al. (2023), the existing EU AI Act isn't enough to deal with the growing influence of LGAIs. The authors argued for a technology-agnostic approach to regulation, emphasising the need of maintaining civility in online debate, levelling the playing field for new AI models,

and keeping pace with rapidly developing AI technologies.

In conclusion, although GenAI has great potential, its ethical implications need serious thought and proactive control. Ethical norms, regulation, and practises that encourage broad participation in innovation may help make the most of benefits while minimising negative effects. The ethical concerns raised by generative AI are shown in Figure 3.

**Fig 3** Ethical Implications of Generative AI



## 7. Conclusions

Improvements in generative AI have the potential to revolutionise many facets of business and software product management, including but not limited to: ideation; market research; user interface and user experience design; Agile software development; requirement elicitation; product definition; product development; and customer support. Large-scale language models like GPT-3 that use generative AI technologies may aid software product managers in automating tedious chores, making data-driven choices, and improving product quality.

Product managers may make use of generative AI from the brainstorming stage all the way up to the finished product. Researchers and software product managers need to keep up with the latest developments in generative AI technologies so that they may find novel applications for these tools.

The use of generative AI solutions in software product management is not without its possible limits and obstacles, however, and they must be recognised and dealt with. It is important to pay close attention in both current practise and future study to issues of bias, transparency, data privacy, accountability, ethics, and integration challenges. Content created by generative AI

still has to be reviewed by product managers to verify authenticity and correctness.

The Responsible Innovation Framework (Owen et al., 2013) outlines a proactive and reflexive strategy to addressing these ethical challenges. Strategies that incorporate a wide range of stakeholders and can quickly pivot to address new problems will be necessary if we are to meet the challenges posed by generative AI. Generative AI technologies may be developed and implemented with the aid of these principles and a full grasp of legal and regulatory requirements like the GDPR (2023) and AI Act (2023) (Hacker et al., 2023).

The ethical implications of generative AI's potential for disruption in the commercial world need thorough standards, regulatory safeguards, and a reflective, proactive approach to the technology's design and application. Responsible and ethical usage of generative AI will become more important to the future of business, necessitating ongoing discussion, investigation, and evaluation to maximise its advantages while minimising its drawbacks.

## 8. Future Research Recommendations

The results of this comprehensive literature evaluation suggest many potential avenues for further study:

Improve current GenAI models by making them more attuned to the unique requirements of software product management tasks including product strategy, product planning, and feature prioritisation.

To fully realise the advantages of AI, it is essential to investigate how generative AI may be incorporated into preexisting Agile techniques. User stories, project plans, and resource allocation techniques created by AI may need to be modified so that they are consistent with Agile concepts and practises.

Software product managers may benefit from individualised AI support by: As generative AI models improve, they may be adapted to meet the specific requirements of particular product managers. Product managers may be able to improve the efficiency and effectiveness of their job with the help of personalised AI assistants that give them with tailored suggestions, insights, and assistance.

Finally, assess the long-term effects of generative AI on software product management processes, focusing on productivity, cost, and quality.

As generative AI technologies advance, they are likely to drastically alter the current state of software product management. Software product managers may harness the promise of generative AI to promote creativity, efficiency, and success in their projects by keeping up with the newest developments, adopting new

applications, and addressing any constraints and ethical issues.

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