

The Impact of Generative AI on Product Management in SMEs

Devasis Pradhan¹, Bibhu Dash², Pawankumar Sharma³ and Sameeh Ullah⁴

¹Department of Electronics & Communication, Acharya Institute of Technology, Bangalore-560107, Karnataka, India

²University of the Cumberlands · Computer and Information Sciences, USA

³University of the Cumberlands · Department of Information Technology, USA

⁴ School of Information Techy, Illionis University, IL, USA

devasispradhan@acharya.ac.in

Abstract. The current innovations in artificial intelligence (AI) have given birth to ChatGPT, an AI forecasted to bring tremendous changes across many fields capable of applying the technology. This paper researches the impacts of ChatGPT Models on Product Management (PM) in Small and Medium-Sized Enterprises (SMEs). The paper employs qualitative research methodology involving an online interview among 78 participants (Product Managers) across different SMEs in the US. To understand the context of the paper, the researchers have provided an elaborated literature review that exclusively features the technology behind the operation of the ChatGPT model and the significance of PM in SMEs. The research used the SurveyMonkey tool to complete the interview and generate trends and patterns that align with the research objectives. Guided by the digital transformation framework, the research identified that PM had several departments (product strategy, product planning, product design, product development, product monitoring, and evaluation), all of which can improve performance when implemented with the ChatGPT model. The research concluded that ChatGPT significantly impacted SMEs' PM with little challenges. This paper also suggests changes that SMEs should accept to undertake when implementing the ChatGPT model to ensure they experience the full benefits of the model.

Keywords: ChatGPT, SMEs, Product Management.

1 Introduction

ChatGPT Model is a natural language processing (NLP) model developed by OpenAI borrowing the same framework as that of Generative Pre-trained Transformer 3 (GPT-3) [1]. The training of the ChatGPT model encompasses the use of a large corpus of conversational data. The huge conversational data is essential to allow the model to generate engaging and believable responses to questions posed by the user. The ChatGPT Model uses NLP as an artificial intelligence and linguistics subfield essential in creating algorithms that understand, analyze, and generate natural language. The GPT-3 model architecture is transformer-based hence generating human-like text. OpenAI developed this architecture with unsupervised learning algorithms and a large

corpus of text-training data [2]. ChatGPT Models is gaining a wide application across different fields, specifically in product management (PM) among Small and Medium-sized Enterprises (SMEs). PM entails developing and implementing strategies to maximize enterprise profits in SMEs. The PM also includes research on customer satisfaction, competition in the market, and innovation opportunities [1]. Hypothetically, different sections of PM (product design, planning, strategy, development, monitoring, and evaluation) in SMEs can benefit from ChatGPT Models. Therefore, this paper adopted a qualitative research approach to explore how ChatGPT can impact SMEs' product management.

1.1 Background

The birth of ChatGPT in 2022 by OpenAI opened a new chapter in artificial intelligence that is prospected to bring great achievements across many fields. With its increased ability to produce information that sounds just like humans, there remains great hope that this discovery will unlock many opportunities that humans would previously only dream about. One of the fields that are gaining competitiveness worldwide for its significance is the PM in SMEs. SMEs are currently the world's economic backbone with the highest employment and contributing to social perspective (as in providing work to vulnerable society members) [3]. PM in SMEs is a significant area that determines the competitive edge of an enterprise [4]. With the invention of the ChatGPT Model, SMEs are either in the early stages or planning to implement it in their PM to keep their enterprises competitive in this AI-oriented era. Currently, there is limited research on the opportunities that SMEs can tap into the ChatGPT Models to remain competitive in the market and improve customer responses. Therefore, this paper adopted a qualitative research approach to explore how ChatGPT can impact SMEs' product management.

2 Literature Review

The literature review for this paper focuses on understanding what exactly product management is in SMEs and how product management plays a central role in the success of enterprises. The review also provides evidence of how the ChatGPT model is gaining prominence in business and how it can supplement product management in SMEs. The research uses information from previously published and reviewed research relating to product management in SMEs and implementing the ChatGPT model in this field of business. To accomplish the research, the researchers used a digital transformation theoretical framework.

2.1 Theoretical Framework

The digital transformation framework is valid for this research because of the framework guidance on the correct approach towards implementing digital technologies in organizational operations. This research majors on identifying the

impacts of implementing the ChatGPT models on product management in SMEs. [5] successfully used the digital transformation framework in their research on integrating digital tools. After a close analysis of digital transformations among organizations, it became evident that about 70% of businesses cannot fully complete their transformation journey. This issue triggers [6] to suggest the correct approach to the digital transformation framework. According to [6], formula 4.0 gives guidelines for an efficient digital transformation framework in their book. The framework should establish a strategy, design, and architecture, implement the digital technology, manage the transition, measure performance and optimize the process. Conclusively, the successful implantation of the ChatGPT in the PM for SMEs will adhere to the digital transformation framework.

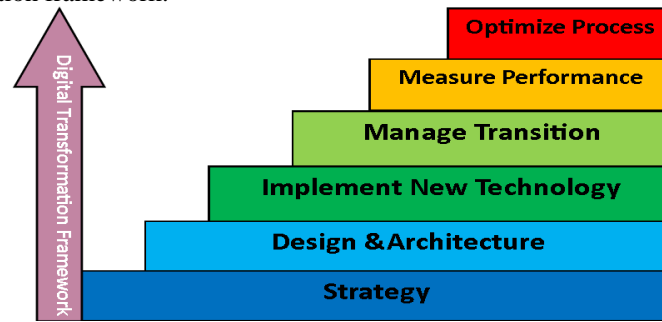


Fig. 1. Digital Transformation Framework

2.2 Program Management in SMEs

SMEs play a critical role in the world's economy. For instance, according to the data from SBA's Office of Advocacy, as of 2023, 33.2 million operating SMEs are in the US. These enterprises create employment and reduce poverty among communities [7]. The significance of SMEs is magnificent; hence, investing and innovating the SMEs will boost the economy at national and international levels. [8] investigated the significance of Innovation in SMEs and found that innovating in SMEs yielded positive results. Just like in big companies, bringing Innovation to the SMEs boosts and streamlines their operations, increasing profitability and competitiveness in the market.

PM is the backbone of SMEs. PM involves a complex process in the SMEs and stands out to position the enterprise at a higher competitive edge, hence drawing profits. [9] analyzed the impacts of product management on SMEs and found that PM encompasses the organization of activities that borders the firm's traditional functions. The PM is divided into strategy, planning, design, development, and monitoring and evaluating. The meshwork of these PM departments ensures that the organization remains focused on its goal by perfecting the business strategy, planning for the progress of the business approach, and designing and developing the product and the marketing strategies to withstand the market pressure [10]. Monitoring and evaluating the product, the customer responses, and the competitors allows the firm to align its strategy with the customer needs and hence meet the market requirements.

Integrating technology in product management for SMEs is essential. Research by [11] show that digital technologies positively affect enterprises when they are used

effectively. The research identified that big data, the Internet of Things, and blockchains have led to a great revolution in business. Throughout the product cycle, technology is beneficial and leads to profit maximization. ChatGPT is one of the current technologies, and its capability is overwhelming in business.

2.3 ChatGPT Model and Program Management

ChatGPT has been launched recently, proving to be a potential tool in business. Research by [12] shows that the model is essential in big data analysis, providing recommendations, and processing orders. The model's capability is outstanding and hence businesses can integrate it to solve business problems that they would not have solved without cutting-edge technology. [13] from Forbes, recently reckoned that this AI tool can augment human operations to magnify the operation through automation while maintaining traditional user engagement. Hypothetically, Barr stipulates that ChatGPT can draft marketing content, brainstorm ideas, write computer codes, automate the sales process, conduct aftercare services, provide customized instructions, enhance automation, translate text to several languages, smooth onboarding process, increase customer satisfaction, among other applications. All these applications are present in SMEs, proving that SMEs can greatly benefit from the ChatGPT model.

ChatGPT model algorithm uses transformer encoder-decoder architecture, a deep learning model for natural language processing (NLP). This algorithm uses self-attention layers, capable of attending to the input data simultaneously. ChatGPT beats the previous recurrent neural networks (RNNs) that processed data sequentially and suffered from vanishing gradients. The self-attention layers allow Transformers to capture long-range dependencies, making it more efficient for NLP tasks [14]. The Transformers have acquired state-of-art performance in language translation, generation, and classification, leading to the adoption of the ChatGPT model in academia and industry.

According to [16], ChatGPT significantly improves economies by integrating into business fields. Different sectors of organizations, including SMEs, can tap the applications of the ChatGPT Models and benefit from PM improvement. Recent research by [17] shows that the ChatGPT model integrates well into the business field since it has already been used to evaluate user experience, create new design ideas, and stimulate interviews with fictional interviews, among other functions. Depending on the machine training, this model can perform assigned tasks [15]. Additionally, research by [18] has provided evidence that the ChatGPT model is already being used in marketing. Henceforth, the ChatGPT model is a potential tool for improving PM in SMEs.

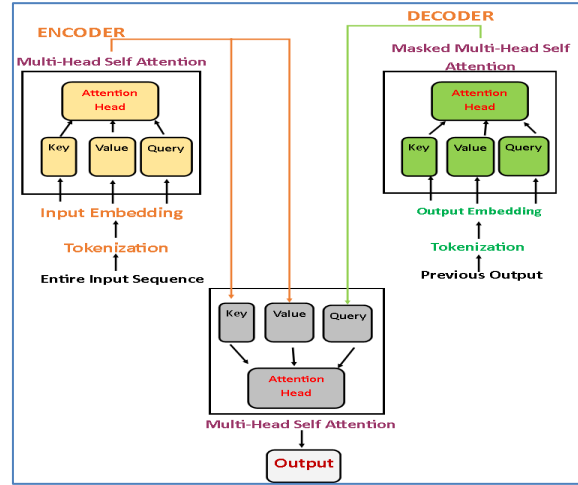


Fig. 2. ChatGPT Algorithm

3 Methodology

3.1 Research Design

The research employed a qualitative approach by conducting an online interview. The interview aimed to get responses from different SME product managers to answer the research questions. The following were the research questions:

- How do ChatGPT models affect SMEs' product management?
- What are the ChatGPT models' implications for SMEs' product management?
- What obstacles do SMEs face when implementing product management ChatGPT models?

The research objectives were:

- To examine ChatGPT models' effects on SMEs' product management.
- To identify ChatGPT models' implications for SMEs' product management.
- To identify the obstacles faced by SMEs when implementing product management ChatGPT models

The study targeted to interview 100 product managers across different regions of the US, that is, East North Central, East South Central, Middle Atlantic, Mountain, New England, Pacific, South Atlantic, West North Central, and West South Central. Interviewing product managers across different locations in the US provided a broad overview of the impacts of ChatGPT models on product management in SMEs.

3.2 Data Collection

The research used an interview to collect data. The interview questions in closed-ended form were designed to draw authentic information from the interviewees (product managers). The selected population included SME product managers who

have integrated ChatGPT Models in their production management or plan to implement ChatGPT in their product management systems. The managers were of ages ranging from 18 to above 65 years. The interview included both genders to participate in the interview, with a total of 48.72% males and 51.28% females. The interview majored in the SME managers' experience using ChatGPT models, the challenges they have faced when using the ChatGPT models, and the ChatGPT model implications on product management. Using a questionnaire encompassing 13 questions, the researchers got efficient responses from the respondents to meet the research objectives. The research used SurveyMonkey online tool to conduct the interviews. Out of the prospected 100 participants, 78 participated in the study. The SurveyMonkey tools allowed filtering of the collected report to show data trends. The trends guided in data comparisons to identify the recurring trends and hence research results.

4 Results

This research aimed to unravel how the ChatGPT model impacts SMEs' product management. Combining the three research objectives provided a broad playground to achieve the research aim. Data collected from the interview was divided into 3 sections based on the research objectives.

To examine ChatGPT models' effects on SMEs' product management.

Understanding the effects of ChatGPT models on SMEs' product management relied on several interview questions as follows.

- 1) What type of product management role are you taking currently?
- 2) What changes have you made to accommodate ChatGPT models in your product management process?
- 3) What advice would you give to other SMEs considering using ChatGPT models for product management?

The first question sought to understand the roles of the managers in SME product management, as this was the best way for them to identify the effects of implementing the ChatGPT models in product management. 17.95% of the participants had a product strategy role; 28.21% were for product planning, 12.82% were for product design, 20.51% were for product development, and 20.51% for product monitoring and evaluation.

The second question was to understand the changes SMEs should undertake when implementing the ChatGPT model in their product management. It was identified that 48.72% of the enterprises had to train staff on the new processes, 23.08% had to revise the existing processes, 14.10% invested in the new technology, and the remaining 14.10% undertook other changes.

Table 1. Changes in SMEs and Product Management when Implementing Generative AI

Sl.No.	Changes when Implementing ChatGPT Model	Significance (%)
1	Investing in new technology	14.1
2	Training staff on new technology	48.72

3	Revising Existing process	23.08
4	Other Effects	14.1

Lastly, the third question rated how the product managers felt about using the ChatGPT model based on the impacts they had identified. The majority of the product managers, 35.90%, felt that it was essential to invest in the right technology; 30.77% suggested that SMEs should ensure proper staff training; 21.79% proposed starting small to test the waters; and 11.54% felt otherwise.

To identify ChatGPT models' implications for SMEs' product management.

The following questions were included in the interview to identify the implications of the ChatGPT model on the SMEs' product management:

1. On a scale of 1-5, how successful have the ChatGPT models been in improving product management in your SME?
2. What led your SME to implement the ChatGPT Model in your product management?
3. What are the implications for ChatGPT Model implementation for product management in SMEs?
4. How has using ChatGPT Models impacted your product management decisions' accuracy?
5. Do you believe that ChatGPT Models are the best option for solving SME product management problems?

The first question sought to identify the success rate in product management improvement for the ChatGPT models. 38 respondents, 48.72%, felt that the ChatGPT model was moderately successful in improving product management; 15 respondents, 19.23% felt that it was not successful; 12 respondents, 15.38% felt that it was somewhat successful; 8 respondents, 10.26% felt that it was very successful, and 5 respondents, 6.41% felt that it was extremely successful.

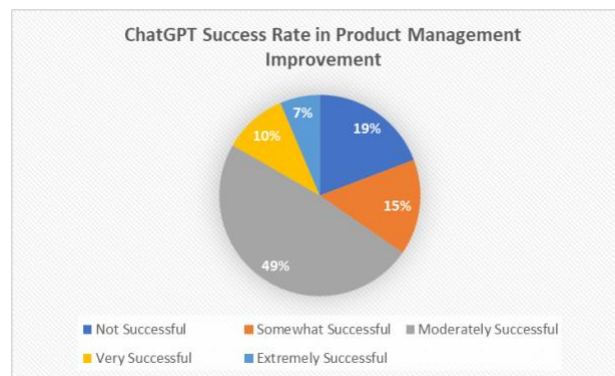


Fig. 3. ChatGPT Success rate in SMEs Product Management Improvement

The second question was necessary to identify the problems that triggered the SMEs to implement the ChatGPT model in product management. 43.59% of the participants reported implementing the ChatGPT model for cost saving, 21.79% for improved customer experience, 20.51% for efficiency gains, and 14.10% for other purposes.

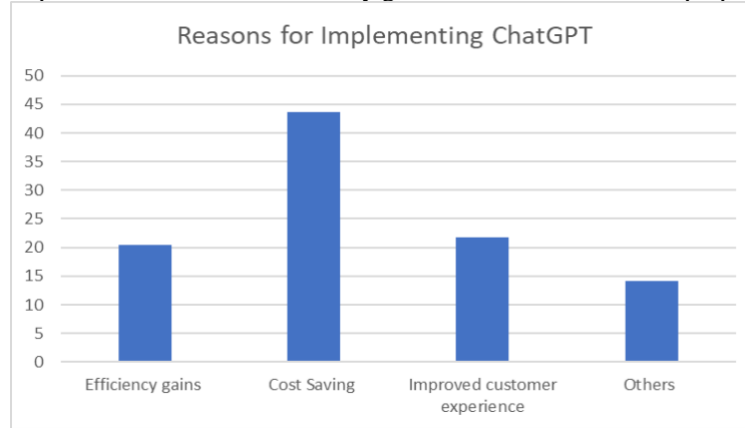


Fig. 4. Factor Triggering ChatGPT Implementation in SMEs Product Management Improvement

The third question is on the implications of ChatGPT Model implementation for product management; the researchers wanted to drill into the impacts of the ChatGPT model when implemented in product management. 23.08% of the respondents confirmed that the ChatGPT model reduced manual efforts in product management; 20.51% of respondents reported improved quality of product decisions; 17.95 reported increased productivity, 14.10% reported increased customer satisfaction, 6.41% reported increased focus on automation; 3.85% reported that they had to revise product development timeline; 14.10% reported other implications.

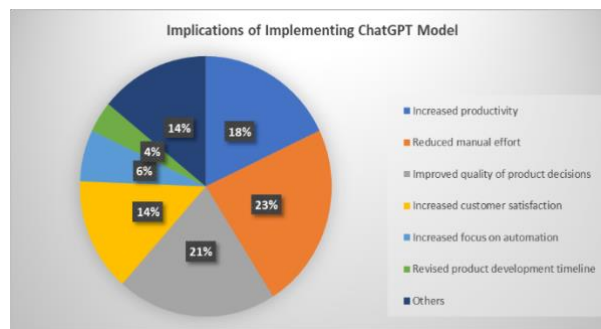


Fig. 5. Implication of Implementing ChatGPT in SMEs Product Management Improvement

The fourth question aimed to understand how the ChatGPT models influenced product managers in making accurate decisions. 42.31% of the product managers felt

that implementation of the ChatGPT brought no change in making accurate decisions; 33.33% felt that the model moderately improved decision-making accuracy; 15.36% felt that the model significantly improved the decision-making accuracy; 6.41 felt that the model moderately decreased the decision-making accuracy; 2.56% felt that the model significantly decreased decision-making accuracy.

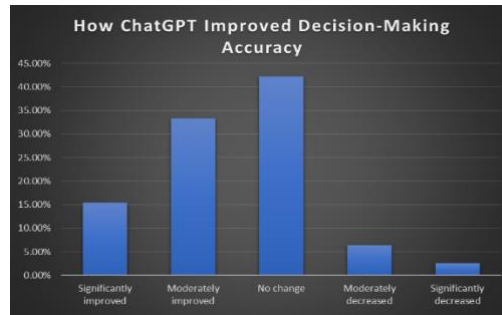


Fig. 6. Capability of ChatGPT to Improve Decision-Making Accuracy in SMEs' Product Management

The last question was necessary to measure the implications of ChatGPT model implementation to the product managers. 44.87% of the participants were not certain whether or not to use ChatGPT models to solve product management problems in SMEs. 24.36% of the respondents felt that the ChatGPT model solved these problems, whereas 30.77% did not believe that the ChatGPT model would solve product management problems in SMEs.

To identify the obstacles faced by SMEs when implementing product management ChatGPT models

Understanding the obstacles facing SMEs when implementing ChatGPT models in product management was key and involved the following interview questions:

1. To what degree are you familiar with ChatGPT?
2. Has your SME implemented ChatGPT Models for your specific product management?
3. What challenges do you face when implementing the ChatGPT Models for product management?
4. What would you consider most when implementing ChatGPT Models for product management?
5. How could ChatGPT Models be improved to meet the needs of SMEs better?

The first question was essential since the degree of familiarity with the ChatGPT model is correlated to managers' knowledge of the obstacles when implementing the model in product management. The majority of the participants. 46.15% were somewhat familiar with the ChatGPT, 30.77% were unfamiliar with the ChatGPT, and 23.08% were very familiar with the ChatGPT model.

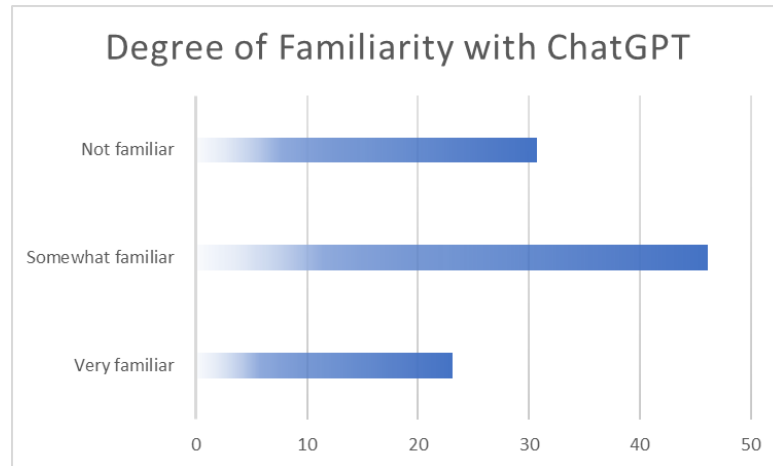


Fig. 7. SMEs' Product Managers Degree of Familiarity with ChatGPT

Secondly, it was essential to understand whether the organization had implemented the ChatGPT model for specific product management fields for the responding product manager. The assumption was that working closely with the ChatGPT model efficiently identified its obstacles. 66.67% reported that the ChatGPT model was not implemented in their specific product management. 33.33% reported that the ChatGPT model was implemented in their specific product management.

The third question identified the SMEs' obstacles when implementing the ChatGPT model in product management. 28.21% of the SMEs find integrating the models into existing systems difficult. 24.36% find difficulty in training the models. 19.23% find difficulty in understanding the model. 14.10% find difficulty obtaining data to train the models, whereas 14.10% find other difficulties.

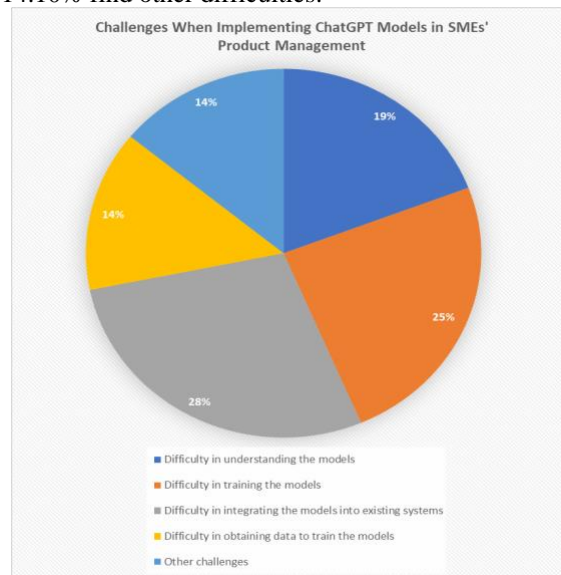


Fig. 8. Challenges When Implementing ChatGPT Models in SMEs' Product Management

The fourth questions examine the criteria for evading obstacles when implementing ChatGPT in SMEs. The managers' things to consider during ChatGPT model implementation. 26.92% said they would consider training the model; 26.92% would consider integrating with the existing system; 17.95% would consider access to data; 17.95 would consider understanding the models; whereas 10.26% would consider other approaches.

Table 2. Factors to Consider When Implementing ChatGPT Model in SMEs' Product Management

Sl.No.	Factor to consider when implementing ChatGPT Model in SMEs Product Management	Significance (%)
1	Access to data	17.95
2	Training of the models	26.92
3	Integration with existing systems	26.92
4	Understanding of the models	17.95
5	Other factors	10.26

The fifth question sought how the ChatGPT model implementations would be improved to meet SMEs' needs. 41.03% of the product managers felt that ChatGPT should improve in faster response times; 25.64% felt that the ChatGPT should improve in accuracy; 21.79% felt that the model should improve the user interface; whereas 11.54% felt otherwise.

Table 3. Ways to Improve ChatGPT Model Implementation to Meet SMEs' Product Management Needs

Sl.No.	Ways to Improve ChatGPT Model Implementation to Meet SMEs' Product Management Needs	Significance (%)
1	Improve accuracy	26.64
2	Faster response times	41.03
3	Improved user interface	21.79
4	Others	11.54

5 Results Analysis & Discussion

This section identifies common themes and patterns in the collected results and explores the implications of the findings to SMEs' product management. Additionally, this section provides the interpretation of the results. SMEs PM is a perfect field

encompassing product strategy, product planning, product design, product development, and product monitoring and evaluation. All these sub-departments in the SMEs PM are essential and collaboratively work together and mutually benefit from each other. The research data revealed that when implementing the ChatGPT model, the company has to make some changes. Based on the significance of these changes, training the staff on the new technology should be given higher priority, as shown in *Table 1*. Other changes during the ChatGPT model implementation are revising the existing technology process and investing in the ChatGPT model. ChatGPT model is a new technology recently launched; hence, many employees are not exposed to the model. Henceforth, training the staff on this new model is essential for the organization to succeed from the model. Based on the research results. Based on the research results, most of the product managers, 35.90%, believed that investing in the right technology (the ChatGPT model) would be essential for the SME PM. Additionally, 30.77% of the product managers believe proper staff training is the first step towards effectively implementing the ChatGPT model.

Based on the research results, ChatGPT model implementation to SMEs PM has positive implications. On a scale of 1-5, most product managers believe that the ChatGPT model has positively impacted PM. 48.72% of the managers believed that ChatGPT had improved PM moderately, 10.26% said it was very successful, and 6.41% said it was extremely successful. In total, the percentage of managers who realized improvement in PM after implementing the ChatGPT model is 65.39%, as shown in *Figure 3*. We expect this percentage rate to continue rising since most SMEs are in the early stages of implementing this new technology. Several factors are triggering SMEs to implement ChatGPT in their PM. The most significant factor is cost saving, with 43.59% of the managers reporting that the model was implemented for cost saving, as shown in *Figure 4*. Other factors triggering ChatGPT implementation in SMEs' PM include efficiency gains and improved customer experience. Henceforth, any SME wanting to remain competitive in the market needs to implement the ChatGPT model as it offers solutions to saving costs, improving customer experience, and increasing efficiency in the production and profitability of the enterprise.

Additionally, the already reported implications for ChatGPT implementations in the SMEs' PM show that the merits outdo the demerits. *Figure 5* displays these implications. Implementing the ChatGPT model in PM significantly reduces manual effort, improves the quality of product decisions, increases productivity, increases customer satisfaction, and increases focus on automation. The revised product development timeline is the reported demerit of ChatGPT model implementation. Though the majority, 43.31% of the product managers feel that ChatGPT model implementation in the PM has not changed the accuracy of decision-making, 33.33% feel that it has moderately improved decision-making, and 15.36% feel that it has significantly improved decision-making, making a 48.69% for product managers who feel that ChatGPT model implementation in SMEs PM has improved decision-making accuracy as shown in *Figure 6*. Therefore, the ChatGPT model can improve decision-making accuracy in SMEs' PM. However, most product managers are unsure whether ChatGPT model implementation can solve SMEs' PM problems. The research forecasts whether the ChatGPT model solves the SMEs' PM problems can be well assessed after prolonged use of this model since its applications are in the early stages.

Familiarity with the ChatGPT model implementation in the SMEs' PM is one of the ways through which the PM can identify the obstacles of the model. Most product managers are familiar with the ChatGPT model, with 46.15% somewhat familiar and 23.03% very familiar, as shown in *Figure 7*. PM is a wide field with several departments, making it hard for SMEs to implement the ChatGPT model covering all departments. This broadness could be why 66.67% of the product managers reported that the model was not implemented in their specific product management department. 33.33% of the product managers operate in product management departments implementing ChatGPT models. Henceforth, product managers working in organizations implementing ChatGPT models, regardless of the department specificity, at least know the ChatGPT models. Some obstacles facing implementing the ChatGPT included difficulty integrating the models into existing systems, difficulty training the models, difficulty understanding the models, and difficulty obtaining data to train the models, as shown in *Figure 8*. The managers suggested several methods to solve these obstacles based on their experience. They suggested that the following factors were significant when implementing the ChatGPT model in SMEs' PM: access to data, training of the models, integration with existing systems, and understanding of the models, as shown in *Table 2*. The product managers also suggested methods to improve ChatGPT models in meeting SMEs' PM needs. These approaches include improving accuracy, faster response times, and user interface, as presented in *Table 3*.

6 Conclusion

Conclusively, implementing the ChatGPT in PM for SMEs has positive and negative implications. Product managers are getting to know this new technology, which is highly accepted among SMEs for its profitability potential. Most SMEs have not implemented the model in all PM departments but plan to use it in some. So far, those who have implemented the model are reporting more positive implications than negative ones. The ChatGPT model promises to increase productivity, reduce manual efforts, improve the quality of product decisions, increase customer satisfaction, and increase focus on automation. All these factors will make the enterprise remain competitive in the market and increase its profits [19]. Additionally, the model has positively improved the quality of decision-making in the PM for SMEs. Some of the negative impacts of implementing the ChatGPT model are that it requires investing in it, revising the existing process, and training the staff on the new technology. Additionally, it might not be easy to understand the model, train it, integrate it into the existing system, and obtain data to train it. However, the system proves outstanding with proper staff training, access to training data, understanding of the model, and correct integration with the existing system.

Recommendations

Based on the research findings, the following recommendations are significant for the use of the ChatGPT model use PM in SMEs:

- SMEs should invest in implementing ChatGPT in their PM to maximize profits and remain steady in a competitive market.

- When implementing the ChatGPT model, it is essential to access the training data and strategize on the best training approach based on the intended function of the model.
- The ChatGPT model should be user-friendly to avoid staff resistance and prevent underperformance which might lead to losses in the enterprise.
- When implementing the ChatGPT model, ensure it correctly integrates with the existing system to avoid complicating the entire system, which might take longer to recover.
- SMEs should train their staff to use the ChatGPT model to ensure they use it well and experience its outcomes.

Future Research

PM is a wide field; therefore, this research sets the background for researching the impacts of ChatGPT models in product strategy, planning, design, development, monitoring, and evaluation. Additionally, the research can be advanced to analyze the impacts of ChatGPT models in organizations other than SMEs and regions other than the US.

Limitations

This research relied on an online interview to collect data from the product managers. Henceforth, there is a high probability of missing critical information concerning the ChatGPT model implementation since the online was rigid and encompassed closed-ended questions. The research sample size was also small, regarding that the research population was the US region which has approximately 33.3 SMEs according to the US SBA's Office of Advocacy. Another limitation of this research was that it only focused on the impacts of the ChatGPT in SMEs' PM and did not focus on the other aspects of PM like strategy, planning, design, development, monitoring, and evaluation.

References

1. M. Iqbal and A. Suzianti, "New Product Development Process Design for small and Medium Enterprises: A systematic literature review from the perspective of open innovation," *Journal of Open Innovation: Technology, Market, and Complexity*, vol. 7, no. 2, p. 153, 2021. doi:10.3390/joitmc7020153
2. S. George, H. George, and G. Martin, "A Review of ChatGPT AI's Impact on Several Business Sectors." 01. 9-23. 10.5281/zenodo.7644359.
3. T. Poufinas, G. Galanos, and P. Papadimitriou, "The competitiveness of small and medium enterprises in adverse economic environments," *Theoretical Economics Letters*, vol. 08, no. 13, pp. 2788–2802, 2018. doi:10.4236/tel.2018.813175
4. V. Nagaraj, "How product managers use sensemaking to drive the front-end of Digital Product Innovation," *Research-Technology Management*, vol. 65, no. 2, pp. 29–40, 2022. doi:10.1080/08956308.2022.2014718
5. M. L. Zapata, L. Berrah, and L. Tabourot, "Is a digital transformation framework enough for manufacturing smart products? The Case of Small and Medium Enterprises," *Procedia Manufacturing*, vol. 42, pp. 70–75, 2020. doi:10.1016/j.promfg.2020.02.024
6. V. Upadrista, *Formula 4.0 for Digital Transformation: A Business-Driven Digital Transformation Framework for Industry 4.0*. Productivity Press, 2021.
7. SBA's Office of Advocacy, <https://advocacy.sba.gov/>

8. S. C. Gherghina, M. A. Botezatu, A. Hosszu, and L. N. Simionescu, "Small and medium-sized enterprises (smes): The engine of economic growth through investments and Innovation," *Sustainability*, vol. 12, no. 1, p. 347, 2020. doi:10.3390/su12010347
9. D. C. Roach, "The impact of product management on SME Firm Performance," *Journal of Research in Marketing and Entrepreneurship*, vol. 13, no. 1, pp. 85–104, 2020. doi:10.1108/14715201111147969
10. V. Nagaraj, "How product managers use senseshaping to drive the front-end of Digital Product Innovation," *Research-Technology Management*, vol. 65, no. 2, pp. 29–40, 2022. doi:10.1080/08956308.2022.2014718
11. P. Sharma, S. Swayamsiddha, and B. Dash, "ProvChain Architecture: Enhanced Privacy and Security for IoT Applications in Cloud," *Second International Conference on Artificial Intelligence, Computational Electronics and Communication System (AICECS 23*
12. I. Cribben and Y. Zeinali, "The benefits and limitations of chatgpt in Business Education and research: A focus on management science, Operations Management and data analytics," *SSRN Electronic Journal*, 2023. doi:10.2139/ssrn.4404276
13. B. Marr, "What does ChatGPT really mean for businesses? " *Forbes*, <https://www.forbes.com/sites/bernardmarr/2022/12/28/what-does-chatgpt-really-mean-for-businesses/?sh=45993e57d1e3>.
14. Daivi, "Demystifying transformers architecture in machine learning," *ProjectPro*, <https://www.projectpro.io/article/transformers-architecture/840>
15. P. Sharma and S. Panda, "Cloud computing for Supply Chain Management and Warehouse Automation: A case study of azure cloud," *International Journal of Smart Sensor and Adhoc Network.*, pp. 19–29, 2023. doi:10.47893/ijssan.2023.1227
16. N. Kshetri, "Chatgpt in developing economies," *IT Professional*, vol. 25, no. 2, pp. 16–19, 2023. doi:10.1109/mitp.2023.3254639
17. A. Kocaballi, "Conversational ai-powered design: Chatgpt as designer, user, and product." *arXiv preprint arXiv:2302.07406*.
18. Jain, Varsha and Rai, Himanshu and., Parvathy and Mogaji, Emmanuel, *The Prospects and Challenges of ChatGPT on Marketing Research and Practices* (March 23, 2023). Available at SSRN: <https://ssrn.com/abstract=4398033> or <http://dx.doi.org/10.2139/ssrn.4398033>
19. M. Rusch, J. Schöggel, and R. J. Baumgartner, "Application of digital technologies for sustainable product management in a circular economy: A Review," *Business Strategy and the Environment*, vol. 32, no. 3, pp. 1159–1174, 2022. doi:10.1002/bse.3099