**Problem Statement**

Background Information: In today’s digital economy, businesses are constantly seeking ways to improve customer engagement and increase conversions through personalized recommendations. Traditional product recommendation systems rely heavily on customer browsing history and preferences to suggest items. However, external factors like seasonal trends, time, purchasing power and popular culture, including celebrity purchases, play a major role in influencing customer behavior and purchasing decisions.

Problem Identification: Many recommendation engines primarily focus on past user behavior, such as browsing history and preferences, without adequately factoring in dynamic elements like seasonal demand and popular consumer trends, such as the types of items celebrity’s purchase. This limitation results in less effective recommendations that may not align with the customer’s immediate or future needs.

Gap Analysis: Existing systems has not adequately incorporated temporal factors (e.g., seasonal or holiday-related trends), environmental contexts (weather conditions, time of year), and social influences (celebrity endorsements or trending products). These factors are critical in shaping customer buying behavior, and neglecting them leads to suboptimal product recommendations and reduced engagement.

Research Question: Can a generative AI-powered recommendation engine be developed to provide personalized product suggestions that adapt dynamically to both customer preferences and external factors such as seasonal trends, celebrity endorsements, and popular consumer behaviors?

Significance: By addressing the gap in current recommendation systems, this project could revolutionize how businesses interact with their customers, delivering more timely and relevant suggestions. The enhanced recommendation engine could boost sales, increase customer satisfaction, and strengthen brand loyalty by anticipating customer needs based on a broader set of influencing factors.

Constraints:

* Data availability: Access to accurate data on customer preferences, seasonal trends, and celebrity purchases may be limited.
* Real-time processing: The engine must efficiently process large datasets in real-time to adapt to trends and customer behavior.
* Privacy concerns: Safeguarding customer data while incorporating external trend data will be essential.

Assumptions:

* Customer purchasing behavior is influenced by a combination of personal preferences, seasonal factors, and external cultural trends, including celebrity purchases.
* Brands will benefit from leveraging generative AI to predict trends and provide highly targeted product recommendations based on a combination of these factors.