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The Role of Generative AI in Designing New Products and Services - A Case Study of Adobe

دور الذكاء الاصطناعي التوليدي في تصميم المنتجات والخدمات الجديدة – دراسة حالة لشركة Adobe

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Abstract:

This study explores the impact of generative AI on product and service design processes, using Adobe's experience as a practical case. It presents the theoretical foundations of generative AI, its main types and tools, and highlights the concept of creative design and its relevance in today's market. By analyzing Adobe's generative tools—such as Adobe Firefly and Adobe Sensei—the study finds that AI significantly accelerates design processes, enhances output quality, and stimulates innovation by offering powerful capabilities to both designers and users.

The findings demonstrate that generative AI enhances production efficiency through automation, improves the quality of design outcomes, and facilitates more creative approaches. The study recommends that organizations adopt generative AI tools strategically, while reinforcing regulatory and training frameworks, particularly in educational and institutional contexts.

Keywords: Generative AI, Product Design, Adobe Services, Creative Innovation.

JEL Classification Codes: L86, O31, M31, C88.

ملخص:

تهدف هذه الدراسة أثر الذكاء الاصطناعي التوليدي في دعم عمليات تصميم المنتجات والخدمات، من خلال تحليل تجربة شركة *Adobe* كنموذج تطبيقي، وقد تم تناول الإطار النظري للذكاء الاصطناعي التوليدي، أنواعه، وأبرز أدواته، بالإضافة إلى مفهوم التصميم الإبداعي وأهميته في السوق المعاصر، فمن خلال تحليل أدوات *Adobe* التوليدية، مثل *Adobe Firefly* و*Adobe Sensei*، تبين أن الذكاء الاصطناعي يسهم بشكل فعلي في تسريع عمليات التصميم، تحسين الجودة، وتحفيز الابتكار من خلال توفير إمكانيات واسعة للمصممين والمستخدمين على حد سواء، كما كشفت نتائج الدراسة عن قدرة الذكاء التوليدي على تخصيص تجربة المستخدم وتحسين التفاعل مع المنتجات والخدمات الرقمية.

وقد توصل البحث إلى جملة من النتائج أبرزها ارتفاع كفاءة الإنتاج بفضل الأتمتة، تطور نوعية المخرجات التصميمية، وتعزيز المقاربات الإبداعية، كما خلص إلى توصيات تدعو المؤسسات إلى تبني أدوات الذكاء التوليدي بشكل مدروس، وتعزيز الأطر التنظيمية والتكوينية المرتبطة باستخدام هذه الأدوات، مع التركيز على تعزيز دورها في البيئات التعليمية والمؤسسية.

كلمات مفتاحية: الذكاء الاصطناعي التوليدي، تصميم المنتجات، خدمات Adobe، الابتكار الإبداعي.

تصنيفات JEL : L86, O31, M31, C88.

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INTRODUCTION:

In recent years, the world has witnessed a radical transformation in the fields of innovation and design, driven by the rapid development of artificial intelligence technologies, particularly generative AI. This type of AI has become one of the key tools revolutionizing the way products and services are created, thanks to its ability to produce creative visual, written, and musical content. This enables designers and developers to overcome traditional constraints and accelerate production processes.

Adobe is a leading global model in this field, having adopted generative AI in developing its creative tools, such as Adobe Firefly and Adobe Sensei, enabling users to design high-quality content more intuitively and innovatively. These tools have contributed to redefining the concept of design, from a process entirely dependent on human skills to a collaborative environment between humans and machines, characterized by speed and innovation.

The main problem: With the rapid development of artificial intelligence technologies and the emergence of generative models capable of automatically producing visual and textual content, new features have begun to take shape in the fields of design and product and service development. This reality has raised fundamental questions about the extent to which generative AI can contribute to innovation and creative design processes, and the extent to which it impacts the human role in these processes. Based on all the above, the following main problem can be raised:

To what extent has generative AI contributed to the design of new products and services at Adobe?

General hypothesis: Generative AI effectively improves the design process for new products and services within Adobe by accelerating production, enhancing creativity, and delivering more efficient and innovative design solutions.

Significance of the Study: The importance of this research stems from the growing global reliance on generative AI technologies in various fields, particularly in the design of digital products and services. With the rapid transformations in design and innovation tools, there is a need to understand how these technologies can enhance designers' capabilities and contribute to creating more efficient and creative solutions. The importance of this research is as follows:

- Shedding light on the transformation brought about by generative AI in the field of creative design;
- Providing a scientific reference for studying the applications of generative intelligence in a realistic corporate environment, such as Adobe.
- Supporting researchers and practitioners with a deeper understanding of the impact of these technologies on design quality and efficiency;
- Contributing to the academic debate on the future of the relationship between artificial intelligence and human creativity.

Study objectives:

- To understand the concept of generative AI and its most prominent applications in the field of design;
- To analyze the role of generative AI in developing digital products and services;
- To study Adobe's experience in adopting and using generative AI tools;

- To monitor the effects of using generative intelligence on creativity, efficiency, and design workflow;
- To draw lessons learned from Adobe's experience and the potential for their application in other organizations.

Study Methodology:

- Research Type: Descriptive and analytical, aiming to describe the concept and application of generative AI and analyze its role in product and service design through a case study of Adobe.

- **Methodology**: The study relies on a qualitative approach, using a documentary content analysis of official reports and sources issued by Adobe, in addition to a review of relevant scientific literature.

- Data Collection Sources: - Official reports and articles issued by Adobe;
- Academic studies and research on generative AI;
- Websites specialized in technology and design;
- Interviews or published statements by developers or users of Adobe tools.
- Research Limits:
- Time Limits: From 2020 to 2025, a period witnessing an increasing use of generative AI tools.

- **Spatial Limits**: The study focuses on Adobe as a leading international organization.

- **Thematic Limits**: The study is limited to the role of generative AI in product and service design, without addressing other aspects such as marketing or distribution.

- Previous studies:

- ✓ **Arabic Studies:**

The first study: Mustafa El-Sayed, **Introduction to Generative Artificial Intelligence,** Dar Al-Fajr Publishing, Egypt, 2024. This study aimed to clarify the concept of generative artificial intelligence and its most important applications in digital fields, especially in design and creativity. The study adopted a descriptive-analytical approach by analyzing recent literature in the field. The study concluded that generative artificial intelligence represents an effective tool in supporting innovation and improving the quality of digital outputs. It also recommended that institutions adopt these technologies while providing the necessary training for users.

The second study, Fatima Awad, **The Role of Artificial Intelligence in Organizational Innovation**, was published in the Journal of Economic Sciences, Algeria, in 2023. This study aimed to analyze the impact of artificial intelligence on innovative performance within organizations. It employed an analytical approach using secondary data. The study concluded that artificial intelligence contributes to improving operational efficiency and reducing costs, while also enhancing the competitiveness of organizations. It recommended the integration of artificial intelligence into organizational strategies.

The third study: Abdul Haq Muhammad, **Modern Artificial Intelligence Tools and Their Applications**, Arab Journal of Technology, Lebanon, 2023. This study aimed to review the most important artificial intelligence tools used in digital design and production. It employed a descriptive approach and concluded that generative tools contribute to accelerating design processes and providing diverse creative solutions. The study recommended the necessity of employing these tools in educational and training institutions.

- ✓ **Arabic Studies:**

The first study: Researchers Ian Goodfellow, Joshua Bengio, and Aaron Courville published a comprehensive, seminal study titled "Deep Learning" with MIT Press in 2016. The study aimed

to develop and analyze a comprehensive theoretical framework for deep learning techniques, with a particular focus on modern generative models such as Generative Adversarial Networks (GANs). The study employed an analytical theoretical approach to deconstruct the structure of complex algorithms. The findings revealed that these models possess a remarkable ability to generate and simulate novel content (visual or textual) that rivals human creativity in accuracy and composition. The study recommended expanding the use of these generative models in engineering and artistic design, as well as in corporate innovation, as tools to enhance the efficiency of the creative process.

The second study: Kumar and Rose conducted a study titled "Generative AI: Opportunities and Challenges," published in a US-based scientific journal specializing in artificial intelligence in 2023. The study aimed to analyze the opportunities and challenges associated with the use of generative artificial intelligence. It employed an analytical approach and concluded that this technology represents a key driver of innovation, but it also presents ethical and regulatory challenges. The study recommended establishing legal frameworks for its use.

- ✓ **Analysis of Previous Studies**

First: Similarities: The main similarities between the previous studies and the current study can be summarized through several key dimensions that reflect a convergence in perspectives regarding the role of generative artificial intelligence in innovation:

- Strategic Orientation: The current study aligns with Awad (2023) and Kumar and Rose (2023) in emphasizing that artificial intelligence is no longer merely a technical tool, but rather a **strategic driver of organizational innovation**. It plays a crucial role in improving operational efficiency and strengthening the competitive position of organizations within dynamic business environments.

- Integration of Human and Machine Roles: The findings of the current study are consistent with those of El-Sayed (2024) and Mohamed (2023), which highlight that generative artificial intelligence does not aim to replace human capabilities, but rather acts as a **creative partner**. It enhances designers' performance by accelerating design processes, expanding the range of innovative solutions, and supporting creative thinking.

- Need for Strategic and Organizational Frameworks: There is a clear consensus between previous studies and the current research regarding the necessity of integrating artificial intelligence within a **well-defined strategic framework**, along with investing in human capital through continuous training and skill development to ensure effective and responsible use of these technologies.

Second: Differences: Despite these similarities, the current study distinguishes itself from previous research through several fundamental aspects:

- Applied Methodology (Case Study Approach): While most previous studies adopted a theoretical or general descriptive approach, the current study is characterized by its reliance on an **in-depth case study methodology**, focusing on Adobe as a leading global model. This provides a more realistic and empirically grounded understanding, enhancing the credibility of the findings.

- Focus on Practical Tools Rather than Theoretical Models: Previous foreign studies, particularly the work of Ian Goodfellow et al. (2016), focused on the technical and algorithmic

structures of generative models. In contrast, the current study emphasizes the **functional and practical dimension** of these technologies, examining how they are transformed into productive tools such as Adobe Firefly and Adobe Sensei, and their direct impact on design processes.

- Timeliness and Market Relevance: The current study focuses on the period 2024–2025, which represents the phase of **practical maturity of generative AI applications** in digital design and service markets. This gives the study a higher explanatory power compared to earlier research that addressed the technology in its developmental stages.

Third: Research Gap: The scientific contribution of the current study lies in addressing several gaps identified in the existing literature:

- Bridging Theory and Real Organizational Practice: There is a noticeable lack of studies, particularly in the Arab literature, that analyze how to build an integrated **AI ecosystem within organizations**. The current study addresses this gap by providing a comprehensive analysis of Adobe's experience in embedding generative AI across its creative and operational processes.

- Providing Updated Quantitative and Qualitative Evidence: Unlike many previous studies that relied primarily on descriptive or theoretical analysis, the current research incorporates **recent quantitative indicators** (such as exceeding 6.5 billion generated assets), combined with qualitative analysis, thereby strengthening its empirical dimension.

- Analyzing Creative Excellence as a Competitive Advantage: While prior studies mainly focused on efficiency and speed, the current study extends the discussion by examining how generative AI contributes to achieving **creative excellence and innovation in product and service design**, particularly through hyper-personalization and advanced generative capabilities. This provides a deeper strategic perspective and enhances its relevance for both researchers and practitioners.

1- Theoretical framework of the study:

1-1 Definition of Generative AI

There are many definitions related to generative AI, including the following:

Generative AI is: "A branch of artificial intelligence that uses advanced computational models such as GANs, VAEs, and Transformers to generate new content (images, text, audio, software, etc.). These models study patterns and relationships within massive datasets, then produce creative and marginally similar outputs that resemble what humans might design, giving them great potential for innovation and customization." (Goodfellow, Bengio, & Courville, 2016, p. 20).

Generative AI also refers to: "systems that can produce innovative outputs similar to what humans might design, using techniques such as generative neural networks and large language models." (Kumar & Rose, 2023)"

Generative AI can be generally defined as: "An advanced type of AI technology that aims to automatically produce new and innovative content based on the analysis of massive amounts of data, allowing it to mimic human patterns of creativity. This type of AI encompasses multiple applications such as generating images, texts, designs, audio, and even programming code, making it an effective tool in supporting design and innovation processes in organizations."

1-2 Types of Generative AI

Generative AI can be classified according to the technologies it relies on. The most prominent of these types are:

- **Generative Adversarial Networks (GANs):** These are based on two competing models: a generator and a discriminator. The former attempts to generate data that resembles the original data, while the latter attempts to distinguish between real and fake data. These are widely used in generating realistic images and videos (Goodfellow, Bengio, & Courville, 2016, p. 716)؛
- **Variational Autoencoders (VAEs):** These rely on transforming data into a latent space and then regenerating it, with the ability to produce a wide variety of content (Kingma & Welling, 2013)
- **Transformer models such as GPT and BERT:** These rely on self-attention and are used for text generation, translation, coding, and more. Prominent examples include GPT-4, ChatGPT, and DALL-E (Vaswani et al, 2017)
- **Multimodal Generative Models:** These models integrate multiple types of data, such as audio, images, and text, and are used in applications such as converting text to video or images (Ramesh et al, 2022)
- **Code Generators**: These models generate code from text descriptions, such as GitHub Copilot and Codex. (Chen et al, 2021)

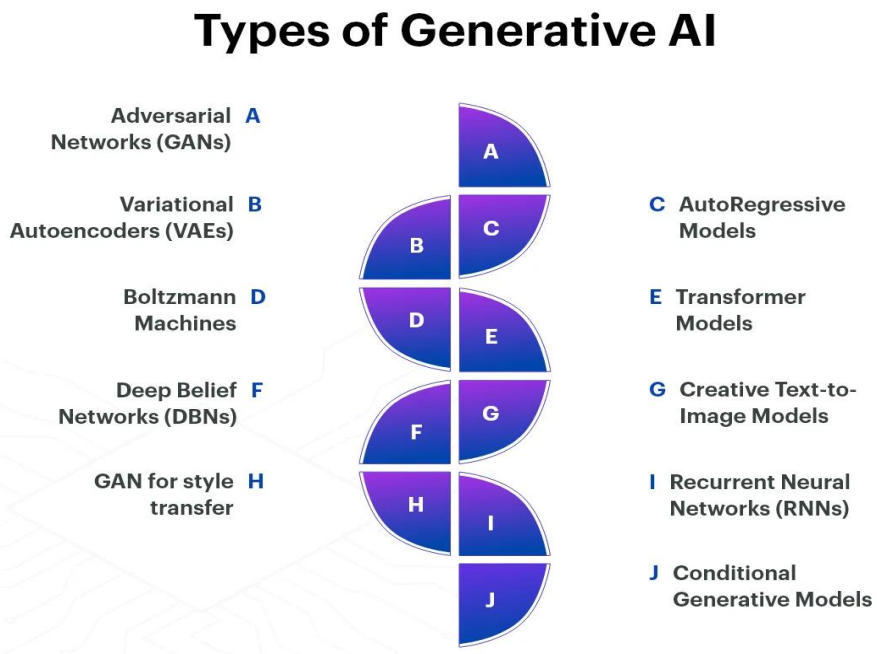


Table (01): The difference between generative artificial intelligence and traditional artificial intelligence

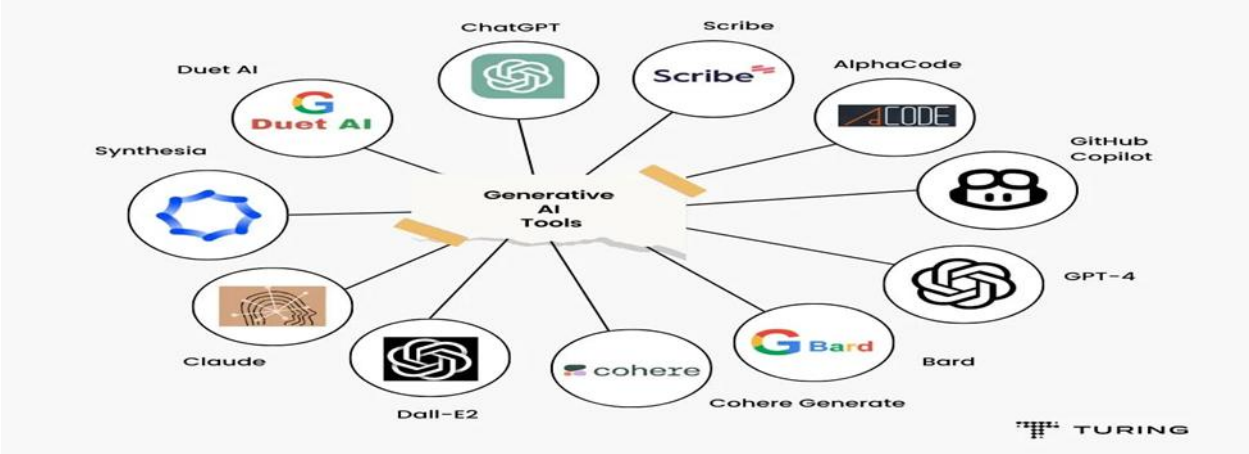
Generative Artificial Intelligence	traditional artificial intelligence	Item
Systems that use neural networks to generate new content	Systems based on explicit rules and algorithms	Definition
Create new data (images, texts, audio...)	Data analysis and decision making	the goal
It relies on deep learning models such as LLM and GAN.	It is based on fixed, hand-programmed algorithms.	How it works
Unstructured data (text, images, video)	Structured Data	Type of data entered
Able to create and self-generate based on training	Limited and produces nothing new	Creativity and learning
Adapts to different contexts and develops its results	Good performance in specific and stable environments	Flexibility
ChatGPT ،DALL·E ،Midjourney	Machine translation systems, fraud detection	Examples

Source: (Al-Shammari, 2023, p. 11) (Ben Sassi, 2023, p. 7) (Al-Sayed, 2024, p. 14) (Bukhari, 2022, p. 9) (Salem, 2023, p. 18) (Awad, 2023, p. 21) (Mohamed, 2023, p. 30)

1-3 Generative Intelligence Tools and Techniques

Generative AI relies on a set of advanced tools and techniques that form the basis of its ability to produce new and innovative content. These tools include:

- **Large Language Models (LLMs):** These are among the most important generative intelligence techniques, as they analyze massive amounts of text data to generate new linguistic content like human language. The most famous of these are ChatGPT and BERT, which are used in conversation, translation, article writing, and complex text analysis (Al-Shammari, 2023, p. 42).
- **Generative Adversarial Networks (GANs):** These are neural networks used to generate new images and videos through a conflict between two networks: one that generates the content, and the other that evaluates it. They are used in facial design, digital art, and augmented reality films (Ben Sassi, 2023, p. 19).
- **Text-to-Image (TTI) techniques:** These enable the creation of images from linguistic descriptions, which are used in marketing, advertising, gaming, and education. Prominent models include DALL·E and Midjourney (Bukhari, 2022, p. 15).
- **Multimodal models:** These handle data from multiple sources simultaneously (such as text, images, and audio) and are used in healthcare and interactive AI applications (Al-Sayed, 2024, p. 26).
- **AI coding assistants:** Such as GitHub Copilot, which help programmers write, test, and debug code automatically based on text commands or raw code (Salem, 2023, p. 33).
- **Creative AI:** This refers to the ability of AI to generate music, paintings, or poetry. It is used in content creation, contemporary art, and entertainment (Mohamed, 2023, p. 39).
- **Intelligent generative simulation:** It is used to create virtual environments for training, modeling, or scenario testing purposes, such as simulating disasters or testing security systems (Awad, 2023, p. 27).



1-4 Product and service design:

1-4-1 The concept of product and service design can be summarized as follows:

Product design is: "Product design is a creative process aimed at developing a new product or improving an existing one, by combining technical and aesthetic functions, in line with user needs and the objectives of the production organization (Ali, 2022, p. 51).

Service design is: "Service design is an integrated planning process that focuses on organizing human, physical, and technological elements to improve the user experience and ensure effective service performance at various points of interaction (Bin Yahya, 2021, p. 39).

In general, product and service design can be defined as: "A systematic strategic process aimed at creating effective and innovative solutions that meet customer needs. This is achieved by developing tangible products or intangible services based on a thorough understanding of user behavior and experience, while considering functional performance, market value, and available technologies. This contributes to enhancing customer satisfaction and corporate competitiveness."

1-4-2 Product and Service Design Stages:

The product and service design process goes through a series of sequential stages aimed at transforming an idea or need into a usable product or service that meets users' expectations. The most prominent of these stages are:

- The research and analysis stage (need discovery): which can be summarized as follows:
Study the market, users, and competitors; Analyze existing problems or opportunities;
Identify customer requirements and behavior.
This stage is the foundation upon which subsequent design is built, as it involves understanding challenges and identifying the actual need (Bin Ammar, 2021, p. 44).

- Ideation Phase: Proposing multiple solutions to meet the identified need; Adopting brainstorming and creative thinking techniques; Focusing on innovation and diversification of solutions.

"The ideation phase opens the door to freedom of thought and multiple possibilities without immediate implementation restrictions" (Marzouki, 2020, p. 58).

- Prototyping and Initial Design Phase: Summarized in (Masoud, 2022, p. 67)
Transforming ideas into prototypes (paper, digital, or real); Testing the initial form and function;

Interacting with early users to gather feedback

- Evaluation and Testing Phase: Presenting the prototype to a group of users; Monitoring interaction and gathering feedback; Modifying the design according to the results.

"This phase is essential for verifying the design's suitability to user needs and its practical effectiveness." (Boushama, 2023, p. 33)

- Final Implementation Phase - Design the final product or service;
- Identify the resources and technologies required for production or launch;
- Work on the supply chain or service infrastructure.

- Tracking and Continuous Improvement Phase (Iteration): Summarized in (Bin Nasser, 2022, p. 41)

- ❖ Collect data after the actual launch;
- ❖ Modify or update the product/service based on market and user behavior;
- ❖ Support continuous development cycles

1-4-3 The Importance of Innovation in the Market

Innovation is a pivotal element in enhancing the competitiveness of organizations within dynamic and changing markets. It is not limited to introducing new products or services alone, but also includes improving operations, redesigning the customer experience, and exploiting technology in new ways to create added value.

Innovation helps companies differentiate themselves from competitors, target new customer segments, and respond flexibly to sudden changes in demand or the economic environment. It also enables them to reduce costs and improve efficiency by adopting new production methods or innovative distribution channels.

"Innovation is a strategic tool that enables organizations to withstand competition by offering higher-value offerings than those available in the market" (Marzouki, 2020, p. 19)

Innovation is also a key source of long-term growth, especially in sectors experiencing rapid technological development, where maintaining quality alone is not sufficient; continuous innovation is required to ensure leadership.

“An organization that does not innovate gradually loses its position in the market, even if it offers a good product, because innovation is the driver of modern market value.” (Bin Nasser, 2022, p. 34)

1-5 The Relationship Between Generative AI and Creative Design

Generative AI represents a qualitative development in supporting and enhancing creative design processes. It is now used as an assistive tool that enables designers to generate new visual and conceptual ideas quickly and efficiently. Through generative models such as DALL·E, Midjourney, and ChatGPT, it has become possible to generate drawings, prototypes, product concepts, or even interactive narratives based on simple linguistic descriptions.

"Generative intelligence does not eliminate the role of the creative designer, but rather enhances it by accelerating creative iteration and opening up unexpected paths to design solutions." (Al-Sayed, 2024, p. 29)

The role of generative intelligence in creative design is particularly evident during the idea generation and visual experimentation stages, providing editable visual prototypes, freeing the designer from technical aspects, and allowing them to focus on vision and innovation.

"Generative AI contributes to creating a diverse design environment that inspires

designers toward creativity rather than replacing them." (Mohamed, 2023, p. 36)

It is also used in interaction design and user interface (UX/UI) design, helping to suggest visual layouts and user experiences tailored to the behavior of targeted users, based on analysis of previous data.

2- Using generative AI to design new products and services at Adobe:

The rapid development of generative AI technologies has profoundly transformed design approaches within organizations, particularly those operating in the creative software industry. While design has for decades been an activity reliant on human creativity and individual experimentation, the advent of generative AI tools has changed the equation, accelerating innovation processes, expanding design possibilities, and enhancing user experiences in ways never before possible.

Adobe is one of the leading global companies investing in integrating generative AI into its creative ecosystem. It has developed intelligent tools like Adobe Firefly and incorporated them into leading design programs like Photoshop and Illustrator. These tools allow users to create visual content from text commands, automatically edit images, and achieve professional-quality creative results in a short time.

Accordingly, this study aims to investigate how generative AI has influenced the design process of products and services within Adobe, and to analyze its impact on creativity, efficiency, and user experience.

2-1 About the Company

Adobe Systems was founded in 1982 in California by John Warnock and Charles Geschke. It began as a company specializing in the development of the PostScript digital printing language, which revolutionized the desktop publishing and digital printing industries (Adobe Inc, 2024, p. 2)

By the late 1980s and early 1990s, the company expanded its operations to include design and visual editing software, most notably Photoshop and Illustrator, becoming one of the world's leading providers of creative and digital design solutions (Adobe Creative Cloud, 2024, p. 4).

2-1-1 Its scope of work

Adobe's areas of work include developing creative design and digital communication software and applications, as part of the Adobe Creative Cloud package, which includes advanced tools for graphic design, photo and video editing, publishing, and audio production. It also includes dedicated tools for content management and digital marketing, such as Adobe Experience Cloud, which enhances its presence in business and institutional environments (Exadel, 2023, p. 5)

2-1-2 Its role in developing AI-powered design tools

Adobe realized early on the importance of integrating AI into its tools, developing the Adobe Sensei platform as an intelligent foundation for improving design and customization processes. Sensei has helped deliver features such as autocorrection, image recognition, and dynamic content generation (Wired, 2024, p. 7)

- In 2023, Adobe announced the launch of the Adobe Firefly series, a suite of AI-powered generative models that allow users to generate images and designs based on text commands and

easily edit content without advanced technical skills. This technology has been integrated into applications such as Photoshop and Illustrator (TechRadar, 2025, p. 3)

- By 2025, the company had expanded its capabilities with tools such as Firefly Image 4, Firefly Video Model, and Firefly Boards, which enabled the creation of a visual collaborative environment based on the instant generation of design ideas, making Adobe at the forefront of companies integrating generative AI into creative design processes (TechRadar, 2025, p. 5).

2-2 Analyzing Adobe's Generative Tools

Recent years have witnessed an unprecedented acceleration in the adoption of generative AI technologies within the creative field, reshaping the way visual and digital content is designed. Adobe has been at the forefront of integrating these technologies into its leading programs, developing a series of intelligent tools that enable designers and users to generate high-quality visual and written content with simple steps.

The launch of Adobe Firefly marked a milestone in this context, offering a generative model trained on licensed and legally secure data, allowing it to be used in commercial applications without copyright risks. Adobe has also integrated these capabilities into its core tools, such as Photoshop, Illustrator, Express, and Premiere Pro, enabling millions of users to leverage the power of AI without leaving their usual work environment.

Given the importance of these developments, this chapter analyzes Adobe's generative tools in terms of their nature, working mechanisms, functions, and impact on the design of products and services. The analysis aims to determine whether these tools are merely supportive or whether they have become an effective element in the innovation and creativity process within organizations that rely on digital solutions.

2-2-1 Adobe Firefly for generating images, text, and creative effects

Adobe Firefly is one of the most prominent generative AI applications launched by Adobe, designed to enable users to create creative visual content from simple text commands. Firefly generates high-quality text-to-image images, artistic text effects, and automatically recolors design elements, along with intelligent editing capabilities such as Generative Fill, which can be used to add or remove elements from images based on the user's description. Firefly is powered by a licensed database of Adobe Stock and public domain content, making it legally safe to use even in commercial contexts. It has also been integrated into creative design applications such as Photoshop, Illustrator, Express, and Premiere Pro, enabling direct creative content generation within users' regular workflows (Adobe Newsroom, 2023)

Additionally, in 2025, Adobe launched Firefly Image Model 4 and Firefly Video Model, along with Firefly Boards, which enable design teams to collaborate generatively in an interactive, AI-powered visual environment (TechRadar, What’s new with Adobe Firefly: Creative AI upgrades, 2025). These tools have accelerated design processes and stimulated innovation, becoming a powerful creative solution for both professional designers and everyday users (Helpx Adobe, 2024).

2-2-2 Adobe Sensei is an AI platform for improving creative workflows

Adobe Sensei is an advanced AI platform developed by Adobe in 2016. It aims to improve creative workflows by automating complex and repetitive tasks and enabling design tools to perform faster and more intelligently. This platform is integrated into Creative Cloud, Document Cloud, and Experience Cloud, giving it the ability to support creative and interactive content at all stages (TechRadar, What is Adobe Sensei? Everything we know about Adobe's

AI platform, 2024, p. 1)

Its most prominent uses in Adobe tools include intelligent content-aware fill, object recognition within images, automatic audio and video effects such as auto-ducking and remix, as well as automatic text and signature recognition in files (Videomaker, 2025).

In 2023, Adobe announced the launch of Sensei GenAI, an advanced version of the platform integrated within Adobe Experience Cloud. This AI assistant uses large language models (LLMs) to automatically generate personalized marketing content and optimize digital campaigns, while preserving the brand's visual and corporate identity (Business Wire, 2023).

Adobe Sensei also offers features such as smart cropping, auto-tagging, and visual data analysis to facilitate search and navigation within digital assets, making it an essential element in enhancing designers' efficiency and stimulating creativity through AI technologies (KBWebConsult, 2024).

2-3 Practical examples of using generative intelligence in Adobe tools

2-3-1 Integrating Generative AI into Programs Like Photoshop and Illustrator

Adobe tools like Photoshop and Illustrator have seen significant advancements with the integration of Adobe Firefly's generative technologies, enabling users to create professional visual content based on text commands. For example, Photoshop's Generative Fill feature can now be used to intelligently add or remove elements from images without requiring advanced design skills. Illustrator's Generative Recolor feature also allows for automatic recoloring of designs based on context and content (Adobe Newsroom, 2023)

This integration has made it easier for designers to visually test ideas in record time and has also contributed to reducing the time required for modification and refinement, making the design process more flexible and innovative (TechRadar, What's new with Adobe Firefly, 2025).

2-3-2 The role of artificial intelligence in personalizing the user experience

The use of generative artificial intelligence extends to personalizing the user experience (UX) through tools such as Adobe Experience Cloud and Adobe Sensei GenAI, which use user behavior data to deliver content and digital experiences tailored specifically to each user. This is done by analyzing users' preferences and previous interactions to provide designs and content that precisely match their interests (Business Wire, Adobe Announces New Sensei GenAI Services, 2023).

These tools are also used in marketing messages, websites, and digital stores, where artificial intelligence automatically creates different versions of content and then selects the most appropriate for each customer category, which enhances their engagement and increases their loyalty to the brand (KBWebConsult, Adobe Sensei GenAI Empowers Your Adobe Experience Cloud Implementation, 2024).

2-4 Results and Performance Evaluation: Analyzing the Impact of AI on Production Speed, Design Quality, and Innovation

Generative AI tools, led by those developed by Adobe, have demonstrated a tangible impact in accelerating creative production and improving output quality and accuracy. In the context of graphic design, for example, features like Generative Fill in Photoshop have reduced complex task execution time from hours to minutes by automating editing processes and

automatically generating visual elements (TechRadar, What's new with Adobe Firefly, 2025).

In terms of design quality, experiments have proven that using Firefly and Sensei yields results with high visual accuracy and artistic integrity, especially in color, recomposition, text formatting, and effects. This has enabled users to produce professional-looking works even without extensive technical expertise (Adobe Newsroom, 2023). Generative AI tools have enabled the execution of multiple design iterations, allowing designers to select the most appropriate versions. This enhances diverse and innovative design strategies.

In terms of innovation, the integrated use of these tools within the workflow has allowed designers to focus on creative thinking and exploring new ideas rather than being distracted by routine processes. Adobe stated that Firefly users generated more than 6.5 billion images in just 12 months, reflecting the rapid growth in AI-powered design (Business Wire, Adobe Firefly Hits 6.5B Generations Milestone, 2024).

Based on these indicators, it can be said that generative AI not only contributes to improving production performance but also serves as a catalyst for innovation and diversity in creative content, making it a strategic tool in the contemporary design environment.

Adobe has seen remarkable progress in adopting generative artificial intelligence (AI) technologies. Data released by the company indicates that the number of images and content created using Firefly exceeded 6.5 billion in less than a year, reflecting the rapid adoption of this technology within the digital creative landscape.

Adobe reports also show that the use of AI tools, such as Generative Fill in Photoshop, has reduced the time required to complete certain design tasks by 60% to 80% compared to traditional methods, particularly in complex editing and visual recomposition processes.

Furthermore, the Adobe Sensei platform relies on analyzing massive amounts of user data, processing millions of daily interactions to personalize digital content. This has led to improved user experience and significantly increased engagement rates, especially in digital marketing environments.

These quantitative indicators reflect several strategic implications, most notably:

The shift from manual to algorithm-driven innovation, an accelerated innovation cycle within the company, increased productivity without a corresponding increase in human resources, and Adobe's transformation from a tools company to a fully integrated digital innovation platform.

Furthermore, this significant usage volume (6.5 billion generation processes) demonstrates that artificial intelligence is no longer merely a tool but has become a fundamental component of the business model.

Table (02): Indicators of artificial intelligence use at Adobe and analysis of its impact

Indicator	Statistical Value	period	Impact on performance	Analysis
Number of contents generated via Firefly	Over 6.5 billion pieces of content	2023-2024	Increased productivity	It indicates widespread adoption of artificial intelligence in creative processes.
Design time reduction percentage	60% – 80%	2023-2025	Accelerated processes	It reflects the efficiency of automation and the reduction of manual labor.
Number of users benefiting from AI tools	Millions of users worldwide	continuous	Market expansion	It signifies global reach and adaptability.
Design quality improvement rate	Significant (qualitative) improvement	continuous	Improved output quality	It results from the use of intelligent algorithms in processing.
Amount of data processed via Sensei	Millions of daily transactions	continuous	Enhanced customization	It enhances user experience and interaction
Number of updates and improvements in Firefly	More than 3 major releases	2023-2025	Continuous innovation	It demonstrates dynamic development within the company.

Source: (Adobe Creative Cloud) (Adobe Inc) (TechRadar, What's new with Adobe Firefly)

The table above shows that Adobe has made significant progress in employing generative AI technologies, with Firefly generating over 6.5 billion pieces of content, reflecting the company's strong reliance on this technology in its creative processes. These tools have also contributed to reducing design time by up to 80%, demonstrating the efficiency of automation and improved productivity.

Furthermore, the Sensei platform plays a crucial role in analyzing massive amounts of data daily, enhancing the user experience through intelligent content personalization. Continuous updates to AI tools reflect the company's commitment to sustainable innovation and its enhanced competitive edge.

4-3 Analyzing the Impact of Creativity and Excellence: The systematic adoption of artificial intelligence has given Adobe a distinct edge in several areas:

Transformation from a "Tool" to a "Creative Partner": AI is no longer merely a technological tool, but has become an active part of the creative decision-making process, allowing designers to focus on artistic vision and innovation rather than routine processes.

Excellence in Quality and Accuracy: Experiments have proven that using Firefly and Sensei deliver outputs with high visual accuracy and artistic integrity in areas such as color distribution, text formatting, and visual recomposition.

Sustainability and Strategic Growth: Adobe has transformed from a company that sells software tools into an integrated platform for digital innovation, doubling productivity without requiring a corresponding increase in human resources, thus strengthening its market position.

The Ability to Experiment: These tools have enabled designers to perform multiple iterations

of designs in record time, allowing for the selection of the most innovative and diverse solutions.

Conclusion:

This study demonstrated that generative AI has become an effective and influential tool in product and service design, not only improving efficiency and speed of completion but also enhancing creativity and expanding the scope of innovation. The Adobe case demonstrated how generative intelligence can be systematically and balancedly integrated into the creative workflow, using tools such as Adobe Firefly and Adobe Sensei, which have helped streamline design processes, personalize user experiences, and provide intelligent solutions that meet market demands.

Study results: The results revealed that the use of generative intelligence tools contributed to:

- Generative AI represents a fundamental shift in product and service design methodologies. It is no longer used solely as a technical support tool, but has become an effective part of the creative decision-making system.
- The integration of human and machine intelligence in design does not weaken the creative process, but rather enhances it, especially in the early stages of idea generation and in the final stages of producing high-quality models quickly and efficiently.
- Generative intelligence helps reduce the time and financial costs associated with design processes by automating repetitive tasks and improving resource management, without compromising the quality of output.
- There are a knowledge and ethical gap among some users and organizations in understanding the limits of using generative content, which requires further guidance and legislation to regulate practices.
- Adobe's experience has demonstrated that investing in generative AI can transform the entire architecture of a digital enterprise, through the development of integrated tools such as Firefly and Sensei that integrate seamlessly into workflows.
- Analysis results showed that integrating Firefly into design programs such as Photoshop and Illustrator significantly increased production speed and contributed to the generation of high-quality visual content that considers both creative and functional contexts.
- Adobe demonstrated its ability to personalize the end-user experience using Sensei GenAI technologies, delivering visual and interactive content tailored to user behaviors and interests, enhancing brand loyalty.
- Data released by the company revealed that Firefly users generated more than 6.5 billion generative designs in less than a year, demonstrating the effectiveness of these tools and their widespread acceptance in the global creative market.

Recommendations: Based on the findings, the study recommends the following:

- Encourage organizations to adopt generative AI in product and service design, while maintaining a balance between automation and preserving human creativity, as Adobe has done by developing tools like Firefly, which enhance productivity without eliminating the role of designers.
- Adobe should continue developing its generative tools, focusing on improving support for non-English languages and cultural diversity in content, thus enhancing the use of its tools in global markets, particularly Arabic-speaking markets.

- Strengthen the integration of Adobe's generative tools with the user experience by expanding behavioral analytics capabilities using Adobe Sensei, allowing to produce more accurate and engaging personalized content.
- Work to expand the availability of Firefly tools to various audiences, including educational institutions and users in developing countries, by providing discounted educational licenses and encouraging academic use of generative tools.
- Call on Adobe to adopt more transparent policies regarding data protection and intellectual property, particularly regarding the use of generative models and their training on clearly licensed data, to ensure trust and sustainability.
- Proposing the creation of joint training programs between Adobe and universities, to build a generation of designers and professionals capable of effectively using generative intelligence and employing it in corporate innovation.

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