THE POWER OF GENERATIVE AI: CHATGPT AND GEMINI AS OPPORTUNITIES OR DISRUPTIONS TO JOB EFFICIENCY IN THAILAND

BY
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พลังปัญญาประดิษฐ์เชิงสร้างสรรค์: CHATGPT และ GEMINI
โอกาสหรือความท้าทายต่อประสิทธิภาพการทำงานในประเทศไทย

โดย

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ดุษฎีนิพนธ์ฉบับนี้เป็นส่วนหนึ่งของการศึกษาตาม
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Lastly, I sincerely hope that this dissertation serves as a valuable resource for those interested in the field and makes a meaningful contribution to the advancement of AI technology, particularly in areas such as operations, policy-making, and strategic planning within the digital economy. I accept full responsibility for any shortcomings in this work and welcome constructive feedback from readers, which will be crucial in further enhancing the academic quality of this research.

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Abstract

This study aims to investigate the factors influencing the adoption of ChatGPT and Gemini, explore the opportunities and disruptions they introduce to various industries and professions, and assess their overall impact on the economy and career development in the digital age. A mixed-methods approach was employed, integrating both quantitative and qualitative methodologies. Quantitative data were collected from 1,159 respondents through closed-ended questionnaires and analyzed using statistical software with binary regression analysis. Qualitative data were obtained through in-depth interviews with 20 purposively selected participants and subsequently analyzed using content analysis and NVivo software. The findings indicate a broadly positive perception of ChatGPT and Gemini as valuable tools for professional development, with adoption likelihood influenced by factors such as age, gender, education level, and usage of specific social media platforms. The study highlights significant opportunities for improving operational efficiencies and fostering innovation across industries. However, it also underscores potential disruptions, including job displacement, data privacy concerns, and the risk of exacerbating socioeconomic disparities. The economic impact of these Artificial Intelligence (AI) technologies is multifaceted, driving the transformation of traditional business models and necessitating a reimagining of career development pathways. The research emphasizes the importance of adaptive policymaking, ongoing skill development, and interdisciplinary collaboration to maximize the benefits of AI while addressing its associated risks.

(Total 319 pages)

Keywords: Artificial Intelligence (AI), ChatGPT, Gemini, Opportunities, Disruptions

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ชื่อดุษฎีนิพนธ์ : พลังปัญญาประดิษฐ์เชิงสร้างสรรค์: ChatGPT และ Gemini โอกาสหรือความท้าทายต่อประสิทธิภาพการทำงานในประเทศไทย

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บทคัดย่อ

งานวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาปัจจัยที่มีอิทธิพลต่อการยอมรับ ChatGPT และ Gemini สำรวจโอกาสและความท้าทาย รวมถึงประเมินผลกระทบโดยรวมต่อเศรษฐกิจและการพัฒนาอาชีพในยุคดิจิทัล งานวิจัยนี้ใช้วิธีการแบบผสมผสาน โดยรวมวิธีวิจัยเชิงปริมาณและเชิงคุณภาพ ในส่วนของการวิจัยเชิงปริมาณ ได้เก็บรวบรวมข้อมูลจากผู้ตอบแบบสอบถามจำนวน 1,159 คน ผ่านแบบสอบถามปลายปิด และใช้โปรแกรมวิเคราะห์ทางสถิติในการวิเคราะห์การถดถอยแบบทวิ ส่วนการวิจัยเชิงคุณภาพ ได้ทำการสัมภาษณ์เชิงลึกกับผู้เข้าร่วมวิจัยที่คัดเลือกแบบเฉพาะเจาะจงจำนวน 20 คน โดยวิเคราะห์ข้อมูลด้วยการวิเคราะห์เนื้อหาและใช้โปรแกรม NVivo ผลการวิจัยแสดงให้เห็นว่า ผู้คนมีทัศนคติเชิงบวกต่อ ChatGPT และ Gemini โดยมองว่าเป็นเครื่องมือที่มีคุณค่าสำหรับการพัฒนาวิชาชีพ ทั้งนี้ ความน่าจะเป็นในการใช้เทคโนโลยีเหล่านี้ขึ้นอยู่กับปัจจัยต่าง ๆ รวมถึงลักษณะทางประชากรศาสตร์ ระดับการรับรู้ และรูปแบบการใช้สื่อสังคมออนไลน์ การศึกษานี้ชี้ให้เห็นถึงโอกาสสำคัญในการเพิ่มประสิทธิภาพการดำเนินงาน และการส่งเสริมนวัตกรรมในหลากหลายภาคส่วน อย่างไรก็ตาม ยังมีการชี้ให้เห็นถึงความท้าทายที่อาจเกิดขึ้น รวมถึงความกังวลเกี่ยวกับการแทนที่งาน ปัญหาความเป็นส่วนตัวของข้อมูล และความเสี่ยงที่อาจทำให้ความเหลื่อมล้ำทางเศรษฐกิจและสังคม ผลกระทบทางเศรษฐกิจของเทคโนโลยีปัญญาประดิษฐ์ (AI) เหล่านี้มีหลายแง่มุม ทำให้รูปแบบธุรกิจแบบดั้งเดิมต้องปรับเปลี่ยน และต้องมีการปรับโครงสร้างการพัฒนาอาชีพ งานวิจัยนี้เน้นย้ำถึงความจำเป็นในการกำหนดนโยบายที่มีความยืดหยุ่น สามารถปรับเปลี่ยนได้ตามสถานการณ์ที่เปลี่ยนแปลงไป การพัฒนาทักษะอย่างต่อเนื่อง และการร่วมมือระหว่างสาขาวิชา เพื่อใช้ประโยชน์จาก AI พร้อมกับลดความเสี่ยงที่อาจเกิดขึ้น

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คำสำคัญ: ปัญญาประดิษฐ์, ChatGPT, Gemini, โอกาส, ความท้าทาย

ลายมือชื่อนักศึกษา .... ลายมือชื่ออาจารย์ที่ปรึกษา ....

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Chapter 1

Introduction

This chapter serves as an introduction to the research undertaken in this study. It commences by providing an exposition of the study's background, followed by the presentation of research objectives, research questions, the study's scope, the conceptual framework, and the study's significance. The chapter's topics are structured as follows:

1.1 Background of the Study

1.2 Research Objectives

1.3 Research Questions

1.4 Scope of the Study

1.5 Conceptual Framework

1.6 Significance of the Study

1.1 Background of the Study

Artificial intelligence (AI), automation, and robots are no longer distant goals in today's world. They have already become ubiquitous in people's lives and are poised to become even more prevalent in the near future (Kessler, 2018; West, 2019). The rapid development of robotics in recent years owes much to the advancement of related technologies. Robots of the past were sluggish and dependent on human assistance to complete complex tasks. However, the current landscape is vastly different, with robots capable of working seamlessly together to accomplish complex tasks in factories and service robots equipped with conversational abilities to understand and assist humans. Thanks to technological advancements, modern robots are intelligent and adaptable, making them useful in a variety of settings. The emergence of AI is the most significant breakthrough in robotics. AI empowers robots to tackle intricate tasks rather than just routine ones, and robots can self-learn and adapt to various environments to improve their interactions with humans. Such developments in the field of robotics hold great promise for the future, enabling robots to perform increasingly complex tasks and augment human capabilities (Cai et al., 2020; Jangjarat, Kraiwanit, Limna, & Sonsuphap, 2023; Javaid, Haleem, Singh, & Suman, 2021). Generative AI, is a subset of AI capable of generating a wide range of content, including audio, text, code, video, images, and various other forms of data. In contrast to conventional AI algorithms, which primarily focus on recognizing patterns in training data and making predictions, generative AI leverages machine learning techniques to produce outputs by drawing from the patterns and information contained in its training dataset. Generative AI exhibits the versatility to generate outputs in the same format as the input prompt, such as text-to-text, or even in different mediums compared to the given prompt. This flexibility enables it to perform tasks like text-to-image or image-to-video generation (Bell, Clarke, & Velasquez, 2023). The rapid advancements in natural language processing (NLP) have given rise to the development of large language models (LLMs), such as ChatGPT and Bard AI, which have had a profound impact on various applications. These models have exhibited outstanding performance in tasks like text generation, machine translation, and code synthesis, among others (Teubner, Flath, Weinhardt, van der Aalst, & Hinz, 2023; Vemprala, Bonatti, Bucker, & Kapoor, 2023).

A recent analysis by PricewaterhouseCoopers (PwC) projects that the global Gross Domestic Product (GDP) could increase by as much as 14% by 2030, equivalent to an approximate rise of US$15.7 trillion. This growth is attributed primarily to the rapid advancement and adoption of AI technologies. The report posits that a significant impetus for this digital revolution will emerge from the extensive data output of the Internet of Things (IoT), which is anticipated to surpass the data volume currently produced by the existing Internet infrastructure focused on human interaction. The study identifies two principal mechanisms through which AI is expected to exert influence on the global economic landscape. Initially, AI is projected to drive productivity enhancements, particularly in sectors with high capital intensity such as manufacturing and transportation. This surge in productivity is anticipated to stem from the automation of routine tasks and the integration of advanced technologies like robotics and autonomous vehicles. Moreover, the synergy of AI with existing human workforces is expected to further elevate productivity. Investment in AI, encompassing assisted, autonomous, and augmented intelligence systems, is envisaged to augment workforce capabilities and liberate human labor from mundane tasks, thereby reallocating it towards more intellectually stimulating and value-adding activities. As productivity increases, a secondary effect is predicted to manifest through the availability of AI-enhanced products and services tailored to individual preferences. This customization is likely to stimulate consumer demand, which in turn will generate more data, perpetuating a cycle of enhanced data generation and utilization. This cycle of improved insights and product quality is expected to further drive consumption. While the benefits of AI adoption are projected to be global, North America and China are poised to reap the most significant advantages due to their early adoption of productive technologies, readiness for AI integration, rapid data accumulation, and enhanced consumer understanding (PricewaterhouseCoopers, 2018; Szczepanski, 2019).

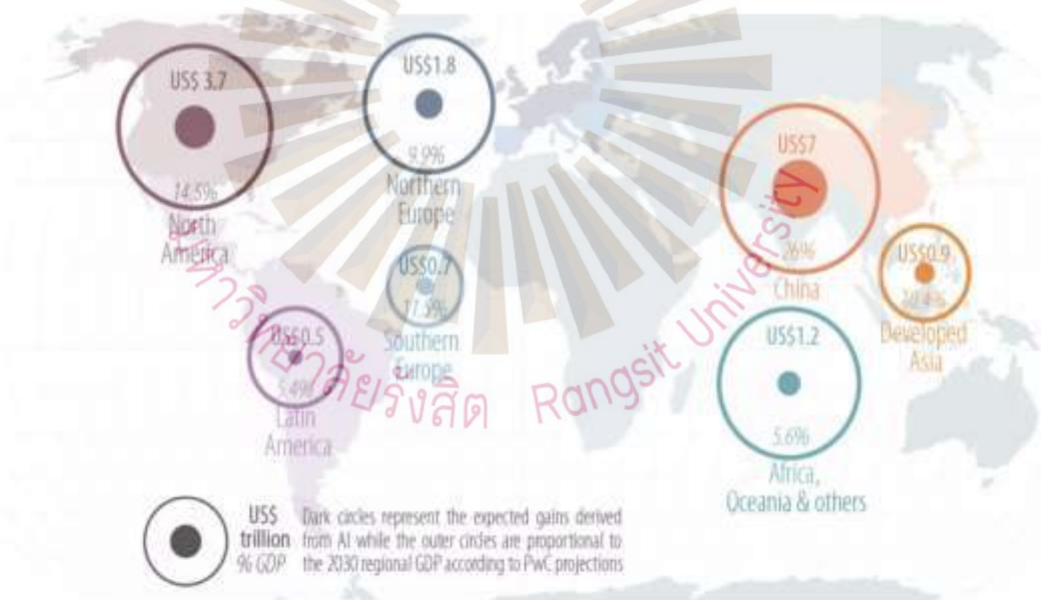

Figure 1.1 Expected Gains from AI in the Different Regions of the World by 2030

Source: PricewaterhouseCoopers, 2018

According to Wutiwiwatchai (2022), AI is anticipated to contribute approximately 15 trillion U.S. dollars to the global economy in the forthcoming decade.

This projection underscores the substantial economic benefits that AI offers, presenting a scenario where governmental entities, including those in Thailand, cannot afford to disregard such a transformative technological advancement. The integration of AI provides a strategic avenue for nations like Thailand to augment their existing economic competencies and to foster economic diversification. Concurrently, this technological shift offers a crucial impetus for the development of new skill sets among the populace, aligning with future-oriented economic and societal needs. The formulation of Thailand's AI strategy was driven by a multifaceted aspiration to elevate the nation’s economic status and enhance the well-being of its citizens, coupled with a spirit of competitiveness. This strategic direction gained momentum following Thailand's observation of its standings in the AI Readiness Index, a metric devised by Oxford Insights. Initially, Thailand’s performance, particularly compared to other Southeast Asian nations, was commendable. However, a noticeable decline in the rankings in 2021 catalyzed a critical reassessment. A detailed analysis revealed that while Thailand performed adequately on several parameters of the index, it notably lacked in a critical dimension: strategic vision. This was exemplified by Thailand's absence of a formal national AI strategy, which resulted in a minimal score in this area. Recognizing this deficiency, the Thai government embarked on developing a structured AI strategy underpinned by quantifiable objectives, aiming to leverage AI for broader economic and social advancements. In February 2021, the Thai government established the Thailand National AI Strategy Working Committee, following preliminary efforts in 2020. This initiative was a collaborative effort between the Ministry of Higher Education, Science, Research and Innovation, and the Ministry of Digital Economy and Society. The committee's first task was to conduct a comprehensive needs analysis and set distinct objectives, involving extensive consultations with stakeholders from both governmental and business sectors. This process entailed the formation of a dedicated team that engaged in workshops and discussions throughout 2020. A significant challenge identified was the development of human capacity and skills necessary for a thriving AI ecosystem. Thailand, at this juncture, lacked a cohesive community of AI experts, characterized by limited formal interaction among existing specialists. To address this, the government initiated the formation of a network and consortium, aiming to not only connect current experts across academia and industry but also to cultivate future AI professionals through structured academic programs in Thai universities. The strategy also recognized the limited application of AI within Thailand's private sector, attributed to a general shortfall in AI expertise and inadequate government support. To rectify this, the strategy included plans for bolstering government assistance, enhancing AI infrastructure, and fostering technology and innovation strategies, alongside augmenting education and research and development infrastructure. To confront these challenges, the Thai government articulated clear goals and established an overarching vision by 2027, Thailand aims to develop an efficient ecosystem for AI development and application, with demonstrable benefits to the economy and quality of life improvements. The strategy delineates three targeted objectives the development of human capacity and technology, stimulation of economic growth, and generation of positive social and environmental impacts. To operationalize these objectives, specific goals and metrics for progress evaluation were established, alongside five sub-strategies. The implementation of this strategy is planned across ten different sectors, to be executed in two phases: from 2022-23 and from 2024-27. Figure 1.2 shows Thailand's national AI strategy and action plan.

Figure 1.2 Thailand's National AI Strategy and Action Plan

Source: Wutiwiwatchai, 2022

As illustrated in Figure 1.2, Thailand's AI strategy is a comprehensive plan, anchored in establishing a robust framework to address the social, ethical, and legal aspects of AI, guided by policies and standards inspired by the Organization for Economic Co-operation and Development (OECD) AI Principles. The success of this framework will be gauged by the implementation and enforcement of AI laws, complemented by educational programs to enhance AI awareness among over 600,000 citizens by 2027. Additionally, the strategy prioritizes the development of a sustainable AI infrastructure, emphasizing enhanced computing capabilities, a national network of AI experts, and an online platform for data analytics, supported by a proposed 10% annual increase in digital infrastructure investment. A significant focus is also placed on education, aiming to bolster human capacity through improved AI-related university programs, public initiatives, and international collaborations, with a goal to develop over 30,000 AI professionals within six years. Innovation and competitiveness are central to the strategy, targeting the application of AI in strategic sectors and the development of core technologies, with an objective to create 100 research and development (R&D) prototypes in six years, promoting AI in both public and private sectors, and encouraging new AI-driven business ventures. In alignment with the OECD AI Principles, the strategy emphasizes building human capacity and international cooperation, envisaging partnerships with global experts for ethical AI development and education, thus positioning Thailand as a forward-thinking player in the global AI arena. The implementation of the strategy is planned in two phases. The first phase, from 2022-23, concentrates on government services, food and agriculture, and healthcare. The second phase, from 2024-27, expands to include education, logistics, security, energy, the creative economy, tourism, trade, finance, and manufacturing. The strategy, endorsed by the Prime Minister’s Cabinet Office, involves the formation of a national AI committee and subcommittees for effective implementation. The overarching goal is to elevate Thailand’s AI capabilities to a level where it plays a significant role in global AI governance harmonization efforts.

In contemporary industries, the implementation of generative AI has significantly improved accuracy and productivity while simultaneously reducing operational costs. Generative AI finds its primary application in healthcare, where it plays a crucial role in the analysis of medical images, thereby assisting clinicians in the diagnostic process. According to the World Health Organization (WHO), approximately half of primary care medical errors are administrative in nature, and generative AI holds the potential to enhance accuracy in this regard. However, its effectiveness relies heavily on the quality of the training datasets, as highlighted by the World Economic Forum. Additionally, the WHO projects a shortage of 10 million health workers by 2030, a gap that generative AI could help alleviate by increasing operational efficiency and allowing a reduced workforce to manage higher patient loads. In the field of finance, AI algorithms are pivotal for fraud detection and identifying investment prospects. Generative AI plays a vital role in automating routine tasks, advancing risk management, and refining financial operations. According to forecasts by Goldman Sachs Research, the incorporation of generative AI in finance could boost the global GDP by 7%, amounting to nearly $7 trillion, and elevate productivity growth by 1.5%. Generative AI's ability to process extensive data aligns seamlessly with the data-centric nature of financial operations. In the manufacturing industry, generative AI is poised to revolutionize manufacturing by its capability to process large volumes of data and forecast outcomes, thereby optimizing decision-making, production processes, product quality, and minimizing waste. It enhances operational efficiency and integrates various data sources for improved performance visibility. Furthermore, generative AI's role in retail extends to optimizing inventory management and personalizing customer product recommendations. It assists retailers in enhancing sales, refining operations, managing inventory, improving customer service, and innovating in product development and system design. In the entertainment sector, generative AI tailors recommendations for movies, TV shows, and music based on user preferences, showcasing its efficiency and precision as seen in other industries (Chui, Hazan, Roberts, Singla, & Smaje, 2023; Elahi, Afolaranmi, Martinez Lastra, & Perez Garcia, 2023; Hallal, Hamdan, & Tlais, 2023; Probasco, Smith, & Velasquez, 2023).

Natural Language Processing (NLP) stands as a rapidly evolving branch of AI, dedicated to enabling computers to understand, interpret, and manipulate human language. This area of study encompasses a wide range of topics, from basic concepts to cutting-edge advancements and prevailing challenges (Mah, Skalna, & Muzam, 2022; Perazzoli, de Santana Neto, & de Menezes, 2022). The concept of efficiency in NLP is centered around optimizing the balance between the resources expended (such as data, computational time, storage space, and energy) and the performance achieved by an NLP model. The aim is to attain comparable results using lesser resources, a pursuit that gains importance as models become larger and more resource-intensive. An essential aspect of efficient NLP is the optimal use of data. This involves not just reducing the quantity of training instances but also maximizing their effectiveness. It is about enhancing the quality and utilization of training data to improve the efficiency of the models, ensuring that they learn more from less. Furthermore, prompting, a technique popularized by advanced models like GPT-3, is another focus area in efficient NLP. It involves using textual prompts to guide models in performing predictive tasks. This method has proven to be effective in managing complex NLP tasks such as question answering, summarization, and machine translation, demonstrating efficiency in both resource use and task execution. These aspects collectively represent the strides being made in NLP, highlighting the ongoing efforts to refine and advance this crucial field within AI (Arora et al., 2022; Barla, 2024; Imamguluyev, 2023; Treviso et al., 2023).

The digital landscape is inundated with data, with more than 80% of this vast expanse comprising unstructured data. This category encompasses texts, images, and videos that lack a consistent structured format, rendering them impervious to representation through graphical or tabular means. Consequently, the utility of unstructured data for businesses is contingent upon its analysis and structuring. This necessitates the application of NLP, a technology designed to process, organize, and interpret unstructured data. Unstructured data encompasses textual, visual, and auditory information that eludes representation in a consistent structured form. It is typified by its lack of conformity to tabular or graphical formats, making it inherently challenging for traditional analytical methods to derive meaningful insights from such diverse and disparate datasets. The imperative to derive value from unstructured data underscores the pivotal role of NLP in contemporary data analytics. NLP serves as a sophisticated mechanism to harness the potential of unstructured data by enabling its processing, organization, and interpretation. Through linguistic analysis and comprehension, NLP bridges the gap between raw, unstructured data and actionable insights, facilitating informed decision-making within various domains. Beyond its utility in data analytics, NLP serves as a conduit for effective communication between individuals and cutting-edge technologies such as AI, machine learning (ML), and robotics. By facilitating seamless interactions and information exchange, NLP contributes to the integration of human intelligence with machine-driven capabilities, ushering in a new era of collaborative technological advancement. The escalating demand for NLP applications is evident in the exponential growth of the NLP market. Projections indicate that the global revenue from NLP is poised to reach approximately 43 billion USD by 2025, as shown in Figure 1.3. This surge is attributed to the increasing recognition among organizations of the pivotal role NLP plays in bridging the communication gap between humans and machines, thereby unlocking the untapped potential inherent in unstructured data (Chirag, 2024).

Figure 1.3 Global Revenue from NLP Market 2017-2025

Source: Chirag, 2024

Given the burgeoning growth of NLP, businesses are encouraged to integrate this technology into their operations. The comprehensive guide presented in this article aims to serve as a foundational resource for navigating the landscape of NLP technology. By exploring its use cases and real-time examples, organizations can gain valuable insights into the transformative potential of NLP, thereby informing strategic decisions in the dynamic digital environment (Chirag, 2024).

ChatGPT (Chat Generative Pre-Trained Transformer) is an AI-powered chatbot designed to provide natural, fluid, dialogue-like responses to queries. The release of ChatGPT, a free chatbot by OpenAI, an AI research firm in November 2022, has generated a lot of buzz on the internet. In the initial months of its launch, ChatGPT sparked users' imagination, leading to numerous potential applications of the model, such as negotiating parking tickets, developing workout plans, and creating bedtime stories for children. ChatGPT has the potential to transform the way humans interact with chatbots and AI, representing a significant development for the field (Reiff & Velasquez, 2023). According to a report by Wodecki (2023) on April 26th, 2023, OpenAI is in the process of developing a ChatGPT Business subscription targeted towards professionals, which is anticipated to provide enhanced control over data and will be released in the foreseeable future. This subscription will be designed to cater to the specific needs of enterprise users seeking to manage their end users. Presently, a premium version, ChatGPT+, is accessible only in India and the U.S. Notably, this upcoming business solution is expected to be well-received by companies such as JPMorgan, Amazon, and Verizon, who have restricted access to ChatGPT for their employees, citing apprehensions about the inadvertent inclusion of confidential business information in the chatbot. Homolak (2023) stated that the release of ChatGPT by OpenAI has generated a significant amount of excitement and interest in the AI community due to its impressive performance and user-friendliness. The chatbot has gained an unprecedented number of users in a short amount of time, positioning itself as the fastest-growing consumer application in history. Given its ability to converse authentically on a wide range of topics, the potential applications of ChatGPT are vast and varied. However, it is crucial to consider both the opportunities and risks associated with its use, particularly in fields such as medicine, science, and academic publishing where its implementation can have far-reaching consequences. As ChatGPT continues to evolve and improve, it is important to engage in thoughtful and informed discussions about the implications of its use to ensure that the benefits of this disruptive technology are maximized while mitigating any potential risks.

Launched in May 2023, Google Bard AI is an advanced AI chatbot developed by Google, designed to respond to user prompts on a wide range of subjects with a near-human level of understanding. It is similar to other AI-powered text generation tools like ChatGPT but is integrated with the power of Google Search, offering users direct access to up-to-date information from the internet. This makes it particularly useful for tasks that require current knowledge or quick access to a wide range of information. Bard AI is based on Google's Pathways Language Model (PaLM 2) and has been trained on a vast dataset that includes text from books, articles, websites, and code from GitHub repositories. This extensive training enables it to perform various tasks like generating text, translating languages, creating diverse types of creative content, and responding informatively to user queries (Alston, 2023; Rudolph, Tan, & Tan 2023; Siad, 2023). The integration of Bard AI with Google's search engine represents a significant milestone in the fusion of AI and search technologies. This combination harnesses the sophisticated language processing capabilities of Bard AI with the extensive informational resources of Google, presenting an excellent opportunity to explore how AI can augment and transform internet information access and interaction. In the realm of NLP, Bard AI's proficiency in understanding and generating human-like text showcases the remarkable progress in this field. Analyzing its performance offers valuable insights into the current capabilities and future potential of AI in comprehending and reproducing complex language structures, contexts, and subtleties. A standout feature of Bard AI is its access to real-time internet information, diverging from many AI models that rely on static datasets. This aspect opens up new avenues for examining how AI manages and processes contemporary and evolving data, marking a significant advancement in AI development. Bard AI's versatility across various domains, including content creation, summarization, and information retrieval, positions it as an ideal subject for studying AI's impact across different sectors. Its applications extend to academic research, creative writing, business analytics, and more, underscoring its widespread utility (Konger, 2023; Liedtke, 2023; Qin et al., 2023). Consequently, Hsiao (2024), together with Pichai and Hassabis (2023), have detailed Alphabet Inc.'s Google's extensive rebranding of its Bard AI chatbot, now rechristened as Gemini. This rebranding endeavor encompasses the launch of a dedicated mobile application and the introduction of a subscription-based model for an upgraded platform version. These strategic adjustments are aimed at enhancing Google's competitive position in the market. Gemini, the rebranded chatbot, is named after Google's advanced AI model series that serves as the tool's foundation and is now accessible in more than 40 languages. The rollout of the mobile application, compatible with both Android and iOS systems, was announced recently. Furthermore, Google has introduced Gemini Advanced, available through a subscription model as part of the Google One AI Premium Plan, priced at $19.99 per month. Concurrent with these updates, the integration of Duet AI into Gemini for Workspace and Google Cloud is planned, expanding the tool's utility across various Google services such as Gmail, Docs, and Sheets. This strategic maneuver aims to strengthen Google's competitive stance, particularly against the premium features offered by OpenAI's ChatGPT and Microsoft's Copilot, and to reposition Gemini in the market by addressing and surpassing the initial criticisms of Bard's functionality (Dogra, 2024; Pichai, 2024; Steinschaden, 2024).

The emergence of ChatGPT and Google's Gemini represents a significant breakthrough in the realm of AI, marked by their extraordinary ability to produce coherent and contextually appropriate responses. This advancement has transformed human-computer interaction, broadening the horizons of what AI can achieve across industries and professional roles. Given this profound impact, ChatGPT and Gemini were chosen as key examples of AI tools in this research, highlighting their prominence, versatility, and broad applicability. ChatGPT, developed by OpenAI, is widely known for its NLP capabilities, facilitating tasks such as content generation, language translation, and customer service assistance, while its accessibility and seamless integration make it popular among users seeking AI-driven support for text-based applications. Conversely, Gemini exemplifies Google's latest advancements in generative AI, tailored specifically for professional applications like data analysis, language modeling, and strategic decision-making. Together, these tools underscore the transformative potential of generative AI to enhance productivity, foster skill development, and reshape workplace dynamics, underscoring the critical importance of studying their influence. Numerous studies have been conducted on ChatGPT and Gemini. For instance, Koga, Martin, and Dickson (2023) investigated the use of ChatGPT and Google Bard, two LLMs, in predicting neuropathologic diagnoses from clinical summaries. Biswas (2023) studied the role of ChatGPT in public health. Cox and Tzoc (2023) investigated the implications of ChatGPT on academia and libraries. Sullivan, Kelly, and McLaughlan (2023) explored ChatGPT in higher education. Still, few studies have investigated its potential opportunities and disruptions across various industries and professions, as well as its impact on the future of career development in the Thai context. Hence, this study aims to investigate the potential opportunities and disruptions, as well as influencing factors, that generative AI, like ChatGPT and Google's Gemini, may introduce to diverse industries and professions, and assess its impact on economics and the future of career development in Thailand. By analyzing the effects of ChatGPT and Google's Gemini on career trajectories—including changes in relevant competencies, job displacement or creation, and career advancement prospects—this research aims to provide comprehensive insights into the role of these AI technologies in shaping the future workforce within the digital economy. The findings of this study may provide valuable assistance to business owners, executives, managers, policymakers, educators, and other stakeholders. The study offers insights into the potential opportunities and disruptions that ChatGPT and Google's Gemini may introduce across various industries and professions, enabling informed decision-making and strategic planning for individuals and organizations. This includes evaluating how these AI tools can be leveraged to enhance productivity and innovation in the digital economy, as well as identifying challenges that need to be addressed to mitigate adverse effects. Furthermore, the research enhances comprehension of the impacts of ChatGPT and Google's Gemini on the future of work and career development within the digital economy. This includes identifying skills and competencies that may become more or less relevant, exploring the potential for job displacement or creation, and assessing how career advancement prospects might evolve. The study yields a detailed exploration of how AI technologies can influence workforce dynamics, helping stakeholders navigate the complexities of AI integration and fostering a proactive approach to managing the transition to an AI-enhanced work environment.

1.2 Research Objectives

The integration of AI technologies into various sectors has sparked transformative changes across the global economic and social landscapes. Specifically, the emergence of advanced AI tools such as ChatGPT and Gemini heralds a new era of digital interaction and automation, promising to redefine the boundaries of innovation and efficiency. This study is structured to methodically address three key objectives:

1.2.1 To investigate the multifaceted factors influencing the adoption of advanced AI technologies, specifically ChatGPT and Gemini.

1.2.2 To explore the potential opportunities and disruptions that ChatGPT and Gemini can bring to diverse industries and professions.

1.2.3 To assess the overall impact of ChatGPT and Gemini on economics and the future of career development in the digital economy.

By examining these aspects, this study aims to contribute valuable insights into the strategic implementation of AI tools, specifically ChatGPT and Gemini, ensuring that its benefits are maximized while mitigating associated risks in the digital economy.

1.3 Research Questions

This study is driven by a series of research questions aimed at uncovering the depth and breadth of AI's impact. To achieve a comprehensive understanding, the research is structured to methodically address three key questions:

1.3.1 What are the multifaceted factors influencing the adoption of advanced AI technologies, specifically ChatGPT and Gemini?

1.3.2 What are the potential opportunities and disruptions that ChatGPT and Gemini can bring to diverse industries and professions?

1.3.3 What is the overall impact of ChatGPT and Gemini on economics and the future of career development in the digital economy?

These questions are designed to guide the exploration of how these innovative AI technologies are reshaping the professional and economic landscapes, thus providing insights into their transformative capabilities and potential challenges.

1.4 Scope of the Study

The scope of this study is delineated across two principal dimensions—the population involved and the content of the inquiry—to ensure a targeted and comprehensive analysis of AI technologies' adoption and impact, specifically ChatGPT and Gemini, within the Thai context.

Regarding the scope of population, this research focused on a specific demographic group in Thailand, consisting of individuals aged 18 years and older. Participants were selected based on their prior experience with advanced AI chatbot technologies, specifically ChatGPT and Gemini. The aim of the study was to gather insights from this group by exploring their usage patterns, preferences, and perceptions of these AI technologies. The selection criteria ensured a diverse representation of Thai adults who had interacted with these platforms, providing a comprehensive overview of the user experience within this technological context.

For the scope of content, this study examined a range of independent variables that influenced the perceptions and use of ChatGPT and Gemini among a specific demographic in Thailand. Demographic factors such as gender, age, educational background, marital status, and income level were crucial for understanding how different segments of the population interacted with AI technologies. Additionally, the research explored the usage patterns of social media platforms including Facebook, Instagram, X (formally Twitter), TikTok, and YouTube to gauge how engagement with these platforms correlated with AI technology usage. Moreover, this study delved into the awareness and knowledge about these advanced AI tools, assessing how respondents became aware of these technologies and their initial impressions. The dependent variables of the research focused on the intentions to adopt ChatGPT and Gemini, aiming to evaluate factors such as skill development, learning enhancement, efficiency improvement, fulfillment of career demands, opportunity creation, and overall satisfaction with these technologies. Additionally, the study examined reactions and attitudes toward AI technologies. This examination included an assessment of concerns and disruptions perceived by respondents regarding the impact of these AI tools on career paths in sectors such as customer service and education. Moreover, the research explored positive perceptions of AI as offering career opportunities, particularly emphasizing their potential to assist in tasks like content generation and essay writing. Lastly, the study assessed the overall impact of ChatGPT and Gemini on the economy and the future of career development within the digital economy.

1.5 Conceptual Framework

In the investigation of the potential opportunities and disruptions that ChatGPT and Gemini may introduce to diverse industries and professions, as well as the factors influencing these dynamics and their subsequent impacts on the future of career development, a conceptual framework has been established as follows:

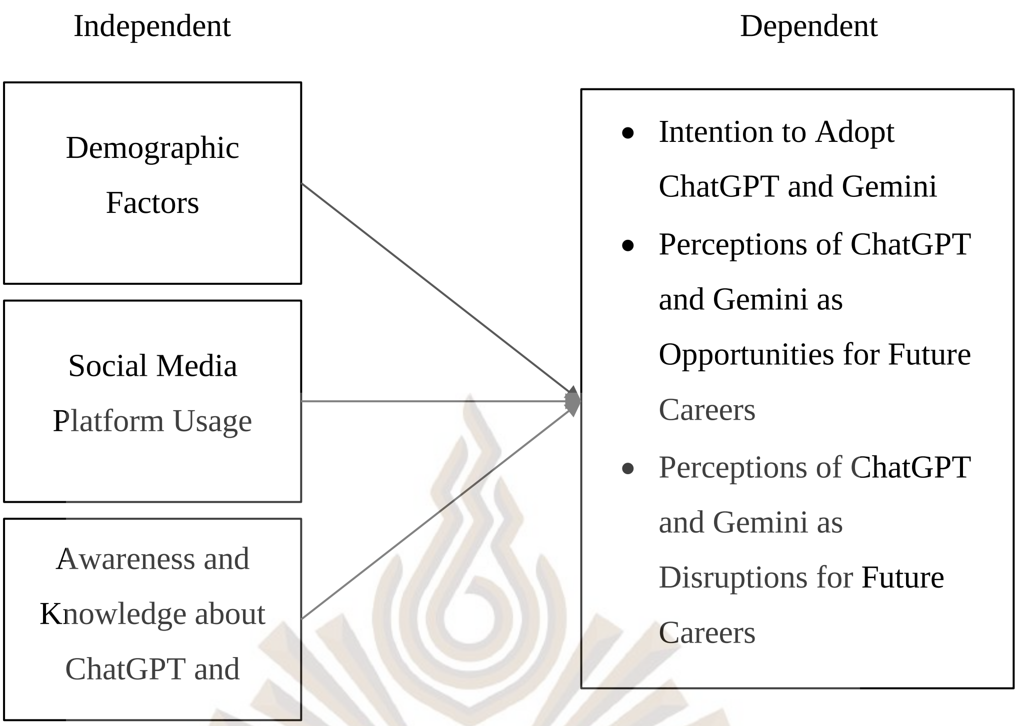

Figure 1.4 Conceptual Framework

Source: Researcher

Figure 1.4 provides a structured approach to analyze the multifaceted interactions between these advanced AI technologies and various professional sectors. It seeks to systematically explore how these technologies alter operational processes, influence labor markets, and potentially reshape career trajectories across different fields. The framework serves as a foundational element of the study, guiding the research methodology and ensuring a comprehensive assessment of the broader economic and social implications of ChatGPT and Gemini within the global digital economy.

1.6 Significant of the Study

The significance of this study is manifold, addressing several crucial aspects of AI adoption, its impact, and its broader implications within Thailand. This research not only uncovers how AI technologies such as ChatGPT and Gemini are perceived and utilized by Thai adults but also evaluates the potential influences of these technologies on employment, career development, and various professional fields. The insights gained are intended to assist policymakers, educators, developers, as well as other stakeholders, in making informed decisions that align with the needs and expectations of the population, thus fostering a more inclusive and efficient integration of AI technologies into society.

1.6.1 Understanding of AI Adoption in Thailand

This study provides valuable insights into how Thai adults perceive and use advanced AI technologies like ChatGPT and Gemini. This understanding is crucial for policymakers, educators, and technology developers to tailor AI applications and policies to the specific needs and concerns of the population.

1.6.2 Impact on Employment and Career Development

The study explores the implications of AI technologies on career prospects and professional development. By assessing concerns about AI replacing human jobs and exploring AI's potential as a tool for career advancement, the research contributes to the ongoing dialogue about the future of work in the age of AI.

1.6.3 Guidance for AI Integration in Various Fields

The findings can guide professionals in fields like customer service, content creation, and education on how to integrate AI tools effectively into their work processes. By leveraging these insights, organizations can enhance efficiency, improve user experiences, and foster innovation, ultimately leading to better outcomes for both employees and clients. Additionally, this knowledge can help teams navigate potential challenges and maximize the benefits of AI technology, ensuring that its implementation aligns with their specific goals and needs.

1.6.4 Policy and Educational Framework Development

The results of this study can inform the development of educational curricula and policy frameworks that address AI literacy and ethical considerations, ensuring that the population is well-equipped to interact with and benefit from AI technologies.

1.6.5 Basis for Future Research

This research can serve as a foundational study for future investigations into AI adoption patterns and attitudes in different demographic segments and regions, providing a comparative perspective and identifying trends over time.

For all intents and purposes, this study significantly enhances the understanding of AI adoption dynamics within Thailand, particularly focusing on advanced technologies like ChatGPT and Gemini. It offers comprehensive insights that are vital for shaping future technological, educational, and policy initiatives. By delineating the ways in which AI technologies such as ChatGPT and Gemini impact employment, career development, and professional practices across various sectors, the research sets crucial groundwork for more informed decision-making by stakeholders. Moreover, the findings not only inform policy and educational strategies but also establish a robust foundation for further scholarly exploration into the evolving relationship between society and AI technology. Ultimately, this study serves as a pivotal resource for navigating the complexities of AI integration, ensuring that advancements in AI are leveraged effectively to benefit the broader Thai society.

Chapter 2

Literature Review

This chapter provides an overview of the literature reviews. The research involved the examination of theoretical concepts and related research works, with the aim of integrating them as frameworks and various approaches for the subsequent investigation. The topics covered in this chapter are organized as follows:

2.1 Artificial Intelligence (AI)

2.2 Natural Language Processing (NLP)

2.3 ChatGPT

2.4 Gemini

2.5 Demographic Theory

2.6 Social Media Platform Usage

2.7 Behavioral Intention and Technology Use

2.8 The Theory of Employment and Unemployment

2.9 Case Studies and Real-world Impacts

2.1 Artificial Intelligence (AI)

The concept of Artificial Intelligence (AI) was first introduced by John McCarthy, often hailed as the father of AI, in 1955. Alongside his colleagues, McCarthy drafted a proposal for the 1956 Dartmouth Summer Research Project on AI. This document was groundbreaking in defining AI as machines capable of performing tasks typically reserved for human intelligence, such as using language, forming concepts, solving complex problems, and self-improvement (McCarthy, Minsky, Rochester, & Shannon, 2006; Sumakul, Hamied, & Sukyadi, 2022). Since its inception, AI has evolved into a significant field within computer science. It has branched out, incorporating insights and methodologies from various disciplines, including anthropology, biology, philosophy, psychology, and linguistics (Górriz et al., 2020;

Luckin, Holmes, Griffiths, & Forcier, 2016). This interdisciplinary approach has led to a myriad of interpretations and definitions of AI, making it challenging to pinpoint a singular definition. Various experts have proposed their own perspectives on what constitutes AI. In a general sense, AI research focuses on creating machines that exhibit aspects of human intelligence (Müller & Bostrom, 2016; Nilsson, 2011). These intelligent machines are often designed to mimic human thought processes and actions. Various definitions, as suggested by scholars like Sarker (2022), Stone et al. (2016), Sumakul et al. (2022), Xu and Zhang (2023), and Zhao, Li, and Xu (2022), emphasize the human-like intelligence aspect of AI. In essence, AI technologies are models that replicate or simulate human cognition and behavior.

AI represents the computational manifestation of human-like cognitive abilities within machines or computer systems. These capabilities empower AI to simulate and replicate human functions, thereby enabling machines to perceive, understand, plan, execute actions, and acquire knowledge in a manner analogous to human intelligence. AI's multifaceted functionality encompasses the capacity to interpret environmental stimuli, identify objects, participate in decision-making processes, tackle intricate problem-solving scenarios, assimilate insights from prior experiences, and mimic discernible patterns. These competencies synergize to execute tasks, such as autonomous driving or facial recognition for device authentication. The AI domain encompasses an expansive array of technologies, including but not limited to machine learning, natural language processing, computer vision, and various others. These cutting-edge technologies enable computer systems to comprehend and interpret human language, glean insights from empirical data, and make anticipatory predictions. When these individual AI technologies are strategically amalgamated and complemented by robust data utilization, advanced analytics, and automated processes, they hold the potential to revolutionize industries and facilitate the attainment of diverse organizational objectives. This transformative capacity extends to optimizing supply chain operations and enhancing customer service, among other business functions (Frankenfield & Scott, 2023; Graham-Smith, 2023; Huawei Technologies Co., Ltd., 2023; Mukhamediev et al., 2022). In essence, the functioning of AI can be delineated through a cyclical process. It commences with the reception of diverse forms of data inputs, such as speech, text, or images. Subsequently, the AI system engages in data processing, employing a repertoire of rules and algorithms to interpret, forecast, and initiate actions based on the received input. Following data processing, the AI system generates an outcome, which can be classified as either successful or unsuccessful with respect to the input data. This outcome undergoes rigorous scrutiny through analytical examination and exploratory investigations. The AI system leverages the findings from this assessment to fine-tune its input data, rules, algorithms, and target outcomes. This iterative feedback loop persists until the desired result aligns with the system's objectives and requirements (Kanade, 2022).

According to Kanade (2022), the concept of intelligence possesses a broader connotation that encompasses a profound capacity to apprehend the environment. However, in the context of AI, the qualification hinges on the harmonious integration and operation of its constituent elements. It is imperative to delve into a comprehensive understanding of the fundamental components that underpin AI. Figure 2.1 presents the key components of AI.

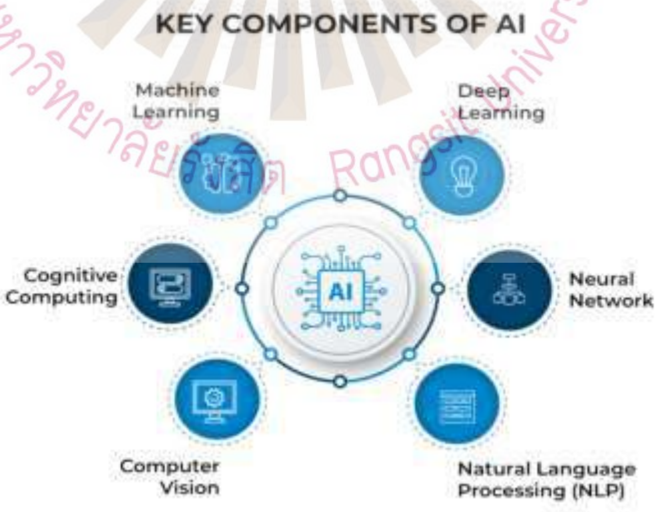

Figure 2.1 Key Components of AI

Source: Kanade, 2022

Machine learning constitutes a pivotal facet of AI, characterized by the autonomous acquisition of knowledge and refinement of performance through iterative exposure to prior experiences, obviating the need for explicit, hand-coded instructions. Deep learning, a specialized subset of machine learning, revolves around the utilization of artificial neural networks for the processing and analysis of data. This subfield plays a crucial role in AI, particularly in complex pattern recognition tasks. Neural networks represent computational structures inspired by the intricate interconnections of neurons within the human brain. These networks facilitate the practice of deep learning, allowing AI systems to assimilate and process information in a manner analogous to human cognitive processes. Cognitive computing endeavors to emulate and enhance the interaction between humans and machines by emulating human thought processes in a computational model. This facet of AI aims to comprehend human language and the semantic content of images, fostering more sophisticated and nuanced interactions between humans and AI systems. NLP stands as a pivotal tool within the AI repertoire, enabling computers to comprehend, recognize, interpret, and generate human language and speech. It plays a central role in facilitating human-machine communication and understanding. Leveraging deep learning techniques and pattern recognition, computer vision empowers AI systems to interpret and discern the content of visual inputs, which encompass a broad spectrum, including images, graphs, tables, and videos, thus enabling AI to glean valuable insights from visual data sources, such as PDF images and video feeds. In essence, AI's prowess is contingent upon the synergy and effective utilization of these core components. Each of these elements contributes uniquely to the augmentation of AI's cognitive capacities, enabling it to engage with and interpret the world in a manner that approximates human intelligence (Kanade, 2022).

Generative AI, a branch of AI technology capable of producing diverse content types including text, imagery, audio, and synthetic data, has garnered significant attention due to the simplicity and quality of content creation enabled by recent advances in user interfaces. This technology, which originated in the 1960s with chatbots, experienced a pivotal advancement in 2014 with the introduction of generative adversarial networks (GANs). GANs facilitated the generation of convincingly realistic images, videos, and audio, sparking both new opportunities and ethical concerns, particularly regarding deepfakes and cybersecurity threats. Key to the mainstream adoption of generative AI have been the developments in transformers and LLMs. Transformers, a form of machine learning algorithm, allow for the training of expansive models on unlabelled data and utilize an 'attention' mechanism to maintain contextual relationships in data. This has enabled the creation of models capable of processing and generating content with unprecedented depth and breadth. Recent innovations have led to the rise of multimodal AI, which can generate content across multiple media types, exemplified by tools like Dall-E. Despite these advances, early implementations of generative AI have faced challenges related to accuracy, bias, and content relevancy, often referred to as “hallucinations”. Nevertheless, the trajectory of generative AI suggests a profound potential impact on enterprise technology and business operations, paving the way for applications in coding, drug design, product development, and business process transformation. In essence, generative AI functions by processing various forms of input through sophisticated AI algorithms to produce new content, with current models simplifying the user experience through intuitive interfaces that facilitate customization of output in terms of style and tone. This evolution highlights both the capabilities and the complexities of generative AI, as it continues to refine the balance between innovation and ethical considerations (Lawton, 2024).

Generative AI is poised to be a transformative force, akin to the introduction of the internet or smartphones, with potential impacts on global labor and economic scales. It is estimated that up to 80% of the workforce could be affected in some capacity, with the technology capable of automating approximately 300 million full-time jobs globally. This shift could contribute to an increase in annual global GDP by as much as 7%. The landscape of generative AI continues to evolve with significant implications for various industries. One prominent trend is the development of specialized language models (SLMs) that cater to specific domains, offering more targeted and potentially accurate outputs. This precision is particularly crucial in fields like healthcare, finance, and legal services, where the stakes are high and the need for reliability is paramount. The trend towards the development of autonomous agents is also notable. These agents are designed to perform tasks and make decisions without human intervention, relying on complex prompt engineering and access to external data sources. This shift aims at reducing IT costs and enhancing productivity by automating more sophisticated tasks. Another significant movement in the field is the closing of the performance gap between proprietary and open-source generative AI models. While proprietary models offer robust backend support and integration capabilities, open-source models provide flexibility and control over data, appealing to those concerned with data privacy and cost. Generative AI's influence extends deeply into content marketing and business process automation as well. In content marketing, generative AI tools are employed to craft highly relevant and coherent content rapidly, significantly boosting productivity. However, challenges like hallucination—where AI presents plausible but incorrect information—persist, requiring careful management and oversight. In finance, generative AI applications are diverse, ranging from virtual assistants aiding in software development and tax consultation to sophisticated tools designed for anomaly detection and fraud prevention. These applications highlight the breadth of generative AI's potential impact across various operational facets, underscoring its transformative power in automating tasks and refining business processes (Alkhaldi, 2024; Amankwah-Amoah, Abdalla, Mogaji, Elbanna, & Dwivedi, 2024; Gupta, Nair, Mishra, Ibrahim, & Bhardwaj, 2024; Kulich & Klubnikin 2024). Figure 2.2 outlines the significant impacts of generative AI across various industries, quantifying its potential to augment or automate processes.

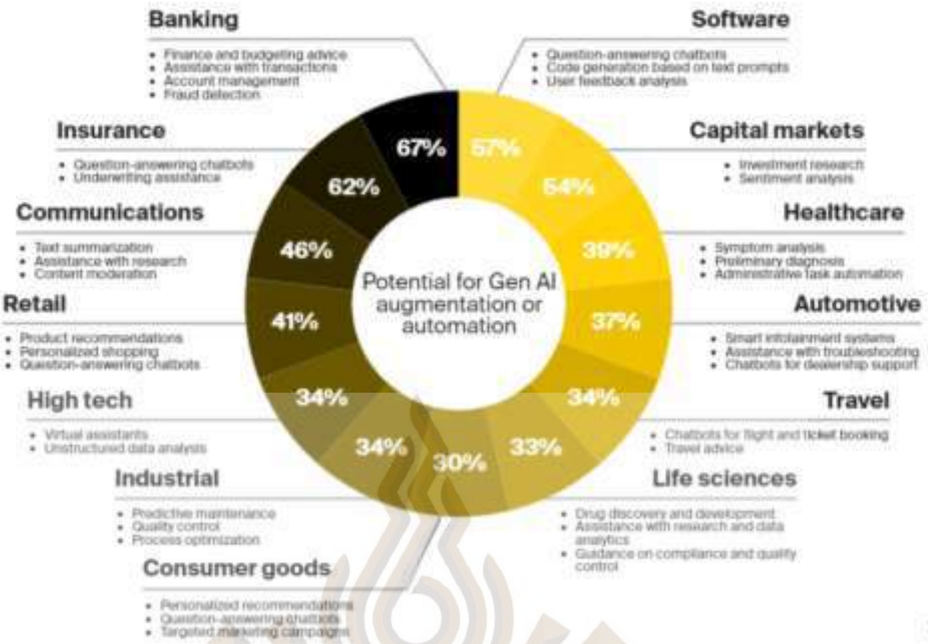

Figure 2.2 Unlocking Gen AI-Driven Industry Innovation

Source: Kulich & Klubnikin, 2024

As presented in Figure 2.2, the banking sector shows the highest potential at 67%, leveraging AI for tasks like fraud detection and account management. Close behind, the software industry could utilize AI for code generation and feedback analysis at 57%, while insurance could benefit from automated underwriting and chatbots at 62%. Other sectors such as communications and capital markets also stand to gain, with applications ranging from text summarization to investment research. Healthcare, automotive, and travel industries show transformative potential in areas like diagnosis, infotainment systems, and ticket booking, respectively. The industrial, high tech, retail, and consumer goods sectors anticipate enhancements in process optimization, data analysis, personalization, and customer interactions. This broad spectrum of applications illustrates generative AI's role as a transformative force across the economic landscape (Kulich & Klubnikin, 2024).

2.2 Natural Language Processing (NLP)

Natural Language Processing (NLP) represents a prominent subfield within the domain of AI, dedicated to endowing computers with the capacity to scrutinize and comprehend human language, encompassing both written and spoken forms. The genesis of NLP is rooted in the aspiration to engender software systems capable of generating and comprehending natural languages, thereby facilitating seamless human-computer interactions characterized by natural conversations, circumventing the necessity for programming languages such as Java or C. NLP leverages computational algorithms and AI techniques to equip computers with the ability to discern and respond to human communication. While an array of NLP methodologies exists, they typically entail the segmentation of speech or text into discrete sub-units, followed by a comparative analysis with a database of unit interrelations derived from historical data (Frankenfield, Clemon, & Li, 2021). Prominent examples of NLP's practical applications are manifest in ubiquitous text-to-speech applications prevalent on iOS and Android platforms, alongside the proliferation of intelligent voice assistants like Amazon Echo (Alexa) and Google Home (Sayers et al., 2021; Tuzovic, 2022).

According to Tariq (2022), NLP is increasingly pivotal in various digital interactions and is utilized to enhance communication between humans and computers. Applications of NLP are vast and multifaceted, significantly reducing human workload and improving task efficiency. Among these applications are email filtering, which simplifies email management by categorizing incoming messages into relevant folders, and language translation, which breaks down language barriers in our globalized world. Additionally, NLP powers smart assistants like Siri and Alexa, enabling them to comprehend and respond to human speech effectively. NLP also plays a crucial role in document analysis, aiding in data organization and retrieval in business and academic settings. Online search enhancements through NLP have made information retrieval more intuitive and accurate, catering to the user's intent rather than just the literal search terms. Predictive text functionality improves typing efficiency on digital devices by suggesting words based on user input patterns. Moreover, NLP facilitates automatic summarization of extensive documents, providing concise versions without losing essential information. Sentiment analysis, another critical application, allows for the interpretation of emotional subtext in text data, which is invaluable in customer service and social media monitoring. Finally, chatbots and social media monitoring tools powered by NLP provide immediate customer interaction and insightful analytics on public opinion, respectively, demonstrating the technology's broad impact across various sectors. Figure 2.3 illustrates a variety of applications of NLP, demonstrating its diverse utility in enhancing human-computer interactions across multiple domains.

Figure 2.3 Applications of Natural Language Processing
Source: Tariq, 2022

The operational paradigm of NLP is underpinned by the amalgamation of AI, computational linguistics, and computer science, converging to process human or natural languages, including speech. This multifaceted process can be deconstructed into three distinct phases. The initial task entails the comprehension of the natural language input by the computer, which is achieved through a statistical model that undertakes speech recognition, transmuting the natural language into a programming language. This transformation is executed by dissecting incoming speech into minute units and subsequently contrasting them with analogous units from prior speech instances. This initial phase is denominated as the speech-to-text process. The subsequent task encompasses part-of-speech tagging or word-category disambiguation, a process primarily concerned with identifying words in their grammatical contexts, classifying them as nouns, verbs, adjectives, past tense forms, and the like, through the implementation of lexicon-based rules integrated into the computer system. Following the culmination of these initial two stages, the computer attains a rudimentary understanding of the meaning embedded in the provided speech. The concluding phase involves text-to-speech conversion, wherein the programming language representation is transformed into an audible or textual format to cater to user requirements. For instance, a financial news chatbot, when queried with a question like "How is Google performing today?" would likely scour online financial sources for Google's stock-related information, subsequently opting to relay specific data such as stock price and trading volume in its response. Thus, NLP serves as an indispensable enabler of enhanced human-computer interactions and information retrieval processes, emblematic of the transformative potential inherent within the AI's realm (Frankenfield et al., 2021).

2.3 ChatGPT

OpenAI, established in 2015, initially focused on utilizing Recurrent Neural Networks (RNNs) to develop generative language models but soon shifted towards the transformative potential of transformer models. This shift was marked by the development of GPT-1, the first-ever transformer-based pretrained language model, which introduced the "pretrain and fine-tune" paradigm that has since become central to NLP. This paradigm enabled more effective model training for a range of downstream tasks and showcased the superior ability of transformers to manage long-term dependencies compared to Long Short-Term Memory (LSTM) models. The success of GPT-1 led to the creation of GPT-2, which expanded on its predecessor by pretraining on a significantly larger dataset, the WebText corpus, and was developed in multiple versions with an increasing number of parameters. This progression demonstrated that larger models tended to perform better, as evidenced by decreases in perplexity which suggested that the models had not saturated their learning capacity, indicating that further gains could be achieved by increasing model size and training duration. These insights and advancements laid the foundation for subsequent developments in the field, leading to the creation of even larger and more sophisticated models such as GPT-3 and GPT-4. This trajectory reflects OpenAI's ongoing commitment to pushing the boundaries of what AI can achieve in understanding and generating human language, continually advancing the capabilities of language models in the process (Kalyan, 2023). Figure 2.4 shows the journey of Open AI starting from GPT-1 to GPT-4.

Figure 2.4 OpenAI Journey Starting from GPT-1 to GPT-4

Source: Kalyan, 2023

The development of ChatGPT has brought about a paradigm shift in the field of NLP, opening up new possibilities for human-computer interaction and advancing the capabilities of language models. ChatGPT, based on the GPT-3.5 architecture developed by OpenAI, is a cutting-edge language model renowned for its ability to generate coherent and contextually relevant responses to user inputs. Fundamentally, ChatGPT is built upon a deep neural network with an extraordinary number of parameters, empowering it to capture intricate patterns and nuances in language. Through extensive pre-training on a vast corpus of text data from the internet, ChatGPT has acquired a broad understanding of grammar, semantics, and world knowledge. This pre-training phase serves as a foundation, enabling the model to generate coherent responses even without specific task-oriented training (Deng & Lin, 2022; Kalyan, 2023; Ray, 2023; Roumeliotis & Tselikas, 2023).

The fine-tuning process plays a crucial role in optimizing ChatGPT for specific applications or domains. This process, known as “prompt engineering,” involves training the model on a more focused dataset tailored to the desired use case. By fine-tuning on domain-specific data, ChatGPT becomes better equipped to provide accurate and contextually appropriate responses, elevating its performance and utility. The development of ChatGPT has been an iterative and progressive endeavor. OpenAI has released several versions of the model, each building upon the successes and limitations of its predecessors. GPT-3.5, the architecture underlying ChatGPT, represents a significant leap forward in terms of model size, boasting a staggering 175 billion parameters. This remarkable increase in scale endows the model with enhanced contextual awareness, enabling it to produce more nuanced and human-like conversation (Ray, 2023; Roumeliotis & Tselikas, 2023; Wu et al., 2023).

According to Cao et al. (2023) and Wu et al. (2023), ChatGPT, incorporating numerous powerful functionalities, integrates multiple technologies including deep learning, unsupervised learning, instruction fine-tuning, multi-task learning, in-context learning, and reinforcement learning. It is an advancement of the original GPT (Generative pre-trained Transformer) model, which has undergone iterative updates from GPT-1 to GPT-4 (as shown in Table 2.1). Initially developed in 2018, GPT-1 focuses on training a generative language model based on a Transformer framework through unsupervised learning, followed by further fine-tuning on downstream tasks. Furthermore. in 2019, GPT-2 introduces the concept of multi-task learning, employing more network parameters and data compared to GPT, allowing the pre-trained generative language model to generalize well to most supervised subtasks without additional fine-tuning. Moreover, to enhance performance in few-shot or zero-shot scenarios, GPT-3 combines meta-learning with in-context learning, significantly improving the model's generalization capabilities and surpassing existing methods across various downstream tasks. Additionally, GPT-3 exhibits a parameter scale that is 100 times larger than GPT-2, making it the first language model to surpass a parameter scale of 100 billion. In the case of the pilot version of ChatGPT (InstructGPT, also known as one of the derivative models in the GPT3.5 series), researchers employ reinforcement learning with human feedback (RLHF) to train the GPT-3 model incrementally, enabling the model to better understand and align with the user's intentions. Finally, with the introduction of GPT-4, a large multimodal model that accepts both image and text inputs and generates text outputs, ChatGPT achieves human-level performance on various professional and academic benchmarks.

Table 2.1 Comparative Analysis of GPT-1, GPT-2, GPT-3 and GPT-4

Parameters	GPT-1	GPT-2	GPT-3	GPT-4
Released date	June 2018	February 2019	May 2020	March 2023
Model parameters	117 million 12 layers 768 dimensions	1.5 billion 48 layers 1600 dimensions	175 billion 96 layers 12 888 dimensions	Unpublished
Context Window	512 tokens	1024 tokens	2048 tokens	8195 tokens
Pre-Training Data Size	About 5 GB	40 GB	45 TB	Unpublished
Source of Data	BooksCorpus, Wikipedia	WebText	Common Crawl, etc.	Unpublished
Learning Target	Unsupervised Learning	Multi-task Learning	In-context Learning	Multimodal Learning

Source: Wu et al., 2023

Apart from the rapid incorporation of new techniques, the expansion of model capacity and the volume of data used for pre-training have significantly contributed to the model's improved understanding of text meaning and intent. Initially, GPT-1 had 117 million parameters and used 5 GB of data for training. However, in GPT-3, these numbers increased to 175 billion parameters and 45 TB of data. While the specifics of GPT-4 have not been publicly disclosed, it is anticipated that there will be a substantial increase in both parameters and data. Therefore, the success of ChatGPT is reliant on various forms of support, including financial resources, computational power, and data availability. As of now, ChatGPT/GPT-4 has demonstrated promising performance as a versatile multimodal task solver, finding extensive applications in fields such as we-media and data analysis. In order to learn long-range dependencies and contextual information from the input texts, GPT-4 employs a transformer architecture with self-attention layers. To reduce memory usage and computational cost, it also makes use of strategies like sparse attention, reversible layers, and activation checkpointing (Cao et al., 2023; Qin et al., 2023; Wu et al., 2023).

The impact of ChatGPT spans numerous domains, exerting significant influence on various industries and applications. In customer support, ChatGPT has proven valuable in addressing frequently asked questions and providing personalized recommendations, thereby enhancing customer satisfaction and streamlining support processes. In content creation, it has emerged as a useful tool for generating text drafts, brainstorming ideas, and refining writing skills. Additionally, ChatGPT has stimulated research and exploration in the realm of human-computer interaction, pushing the boundaries of language understanding and generation (George & George 2023). Despite its impressive capabilities, ChatGPT does face certain limitations. One primary challenge lies in its sensitivity to input phrasing and context. Minor alterations in the wording of a question can elicit different responses, and the model may occasionally generate incorrect or nonsensical answers. Furthermore, ChatGPT tends to be verbose at times, and it may exhibit tendencies to overuse certain phrases or produce responses that sound plausible but lack factual accuracy. To address these limitations, OpenAI has emphasized responsible use of ChatGPT and implemented safety measures. Additionally, the model includes a moderation system designed to filter out inappropriate or harmful content, ensuring a safer user experience. OpenAI actively seeks feedback from users to identify weaknesses and areas for improvement, with the aim of refining the model's performance and addressing its limitations (Hassani & Silva, 2023; Holland, 2023; Zhang, Shah, & Han, 2023).

2.4 Gemini

Bard AI, a creation of Google, represents a significant advancement in the text-based AI chatbot that leverages NLP and machine learning to furnish real-time responses. Initially introduced to users in the United States and the United Kingdom on March 21, 2023, Bard operated exclusively in the English language during its initial release. However, in July 2023, it expanded its language support and accessibility to a broader audience. As of September 2023, Bard's availability extends to more than 40 languages, including but not limited to Arabic, Chinese, German, Hindi, and Spanish. Furthermore, Bard is accessible in over 230 countries and territories worldwide, rendering its services globally accessible. This sophisticated AI system exhibits utility in a spectrum of domains, encompassing creative tasks, the elucidation of intricate subjects, and the systematic extraction of data from a diverse array of internet sources. Notably, Bard demonstrates proficiency in addressing complex queries, including the identification of suitable recipes based on the available ingredients within a user's refrigerator, a task not attainable through conventional Google search methodologies. Consequently, Bard elevates the conventional stature of Google from that of a rudimentary search engine to a highly adept virtual assistant (Grant & Metz, 2023; Kabir, 2023; Plevris, Papazafeiropoulos, & Jiménez Rios, 2023; Wadhwani, 2023).

Bard's foundational framework relies upon the Pathways Language Model 2 (PaLM 2), introduced in the latter part of the year 2022. It is pertinent to note that PaLM 2 is the successor to Google's Language Model for Dialogue Applications (LaMDA) technology, originally unveiled by Google in the year 2017. Both these linguistic models are underpinned by the neural network architecture known as the Transformer. This framework, once made openly available by Google, has assumed a pivotal role in underpinning the development of several efficacious AI tools. Bard's conceptualization was profoundly influenced by the field of search. It endeavors to propagate the prevalence of natural language search queries, thus supplanting the conventional reliance on keyword-based queries. Bard's AI sophistication is continually refined through the facilitation of conversational interactions characterized by a natural-sounding voice, thereby affording contextual elucidation in responses, as opposed to mere cataloged replies. Bard is expressly devised to accommodate follow-up inquiries, a distinctive feature within the realm of search functionality. To facilitate scalability and accommodate a burgeoning user base, Bard's initial iteration of LaMDA incorporated a streamlined model variant that imposed lesser computational resource demands. The PaLM language model's integration further enhances Bard's capacity to proffer visually enriched responses to user queries, thus augmenting its efficacy as a virtual assistant in the context of diverse informational needs (Aydin, 2023; Waisberg et al., 2023).

Bard AI finds diverse applications across multiple sectors, each benefiting from its unique capabilities. Bard AI's application in customer support is transformative. Utilizing advanced natural language processing technologies, it excels in text analysis, particularly in sentiment analysis. This capability allows businesses to derive meaningful insights from customer feedback, enabling them to better understand and meet their customers' needs. By analyzing customer interactions, Bard AI helps in tailoring services and responses, thus significantly improving the overall customer experience. Furthermore, the integration of Bard AI with Google Apps and Services marks a significant advancement in workflow management. This integration allows online businesses to automate a range of routine tasks, such as sending emails, generating reports, and updating databases. The automation of these tasks not only saves time but also increases accuracy and efficiency, leading to smoother and more productive business operations. At the core of Bard AI is LaMDA, which enables it to engage in nuanced, multi-turn dialogues. By employing machine learning and data analytics algorithms, Bard AI can interpret and respond to user prompts in a highly personalized manner. This feature is particularly beneficial in creating user-specific responses, as it can extract key information from interactions and tailor its responses accordingly, enhancing the overall user experience (Jenkins, 2024; Ooi et al., 2023).

Bard, a pivotal element in Google's strategic and long-term endeavor to ethically advance LLMs, has undergone thorough research and development. This process has unveiled several intrinsic limitations typical to LLMs. Primarily, despite its foundation in Google's renowned expertise for quality information, Bard is prone to generating inaccurate responses, especially in complex or fact-based scenarios. This issue stems from the core nature of LLMs, which predict words or sequences without an effective mechanism for verifying factual accuracy. As a result, Bard might produce responses that are more reflective of learned patterns from its training data rather than based on sophisticated reasoning or calculations, potentially leading to misinformation. Moreover, the wide-ranging perspectives and opinions in Bard's training data, drawn from public sources, present challenges in delivering balanced and impartial responses. The LLM may inadvertently echo existing gaps, biases, and stereotypes in the data, resulting in responses that may represent narrow cultural or demographic viewpoints, reinforce harmful stereotypes, or manifest biases concerning gender, religion, or ethnicity. Addressing this issue requires continuous enhancement of the training data and active collaboration with domain experts and varied communities. At times, Bard's responses might inaccurately imply personal opinions or emotions, a byproduct of training on human-like language. To mitigate this, specific guidelines have been formulated to steer Bard's persona towards providing objective and neutral responses. Additionally, Bard is equipped with technical safeguards to avert responses to inappropriate prompts or the generation of harmful content. However, these safeguards are not foolproof, occasionally leading to false positives (no response to valid prompts) or false negatives (unsuitable responses despite the safeguards). Continual refinement of these models is crucial to better discern safe and appropriate inputs and outputs. An essential facet of Bard's development is anticipating and addressing risks associated with users attempting to manipulate its capabilities or circumvent its safety measures. Despite rigorous testing, the dynamic nature of user interactions calls for constant vigilance and adaptation to prevent the dissemination of problematic or sensitive content. In sum, these areas highlight both the challenges and the potential for growth in Bard and LLMs more broadly. Google's unwavering commitment to these challenges aims to progressively improve Bard's reliability, safety, and ethical standing, marking it as an innovative foray into generative AI (Manyika & Hsiao, 2023).

Furthermore, Google's large language model landscape evolved in early 2024. Bard AI provided an important public platform for tasks such as writing, planning, and learning. However, continuous advancements during the first year necessitated a name change to reflect the company's expanded capabilities. Thus, Bard was renamed as Gemini, indicating a significant evolution beyond simple nomenclature. The name change made sense from a marketing standpoint, as Google plans to expand its AI services. It is a way for Google to raise awareness of its advanced LLM offering, as AI democratization and advancements continue to accelerate. This new iteration, powered by the advanced Gemini family of models, provides a broader range of features. Users can use Gemini to collaborate on creative projects, navigate complex instructions, and even experiment with basic coding tasks (Batra, 2024; Hsiao, 2024). Figure 2.5 depicts a snapshot of the Google’s Gemini homepage.

Figure 2.5 Snapshot from the Gemini Homepage

Source: Gemini, 2024

Google's Gemini AI model is a pioneering advancement in NLP, specifically designed to excel in storytelling applications. Launched as an evolution of the company's previous efforts in this area, such as language model for dialogue applications (LaMDA) and Reformer, Gemini represents a significant leap forward in AI-generated narrative capabilities. What sets Gemini apart is its ability to create coherent and engaging stories that maintain context and consistency over longer passages, addressing a common limitation in earlier NLP models. Gemini achieves this through a combination of innovative techniques, including Transformer-based architectures and reinforcement learning approaches. These enable the model to not only understand language at a deeper level but also to generate narratives that exhibit a nuanced understanding of character dynamics, emotions, and plot development. This allows Gemini to produce stories that feel more human-like and immersive, enhancing the overall quality of AI-generated content. In its latest update in February 2024, Google announced several enhancements to Gemini's performance. These enhancements include increased contextual understanding, which leads to more coherent and relevant storytelling. Additionally, Gemini now demonstrates an improved ability to maintain consistency and coherence over longer texts, making it more suitable for a wider range of storytelling applications. Overall, Gemini represents a significant milestone in the field of NLP, with implications for various industries. From improving virtual assistants and chatbots to aiding writers and content creators, Gemini's capabilities are poised to revolutionize how we interact with and consume content generated by AI. Its continued development and refinement highlight the potential for AI to transform not just the storytelling landscape but also the broader relationship with technology (Pichai & Hassabis, 2023; Pichai & Hassabis, 2024).

2.5 Demographic Theory

Scholarly discourse has consistently emphasized the significance of demographic shifts as essential determinants of a nation's economic development. The relationship between demographic changes and a country's economic performance, especially regarding economic growth, has been thoroughly investigated and supported by empirical evidence. These demographic shifts are pivotal as they directly impact labor markets, consumer behavior, capital allocation, and overall productivity. Consequently, a comprehensive understanding of demographic dynamics is crucial for policymakers and economists engaged in forecasting economic trends and devising strategies to enhance economic growth in response to these shifts (Chishti, 2022). The term “demographics” encompasses a broad spectrum of statistical characteristics of populations that are utilized to delineate specific groups and markets for various applications. Such characteristics commonly include age, gender, race, and other identifiers that facilitate the collection of data relevant for multiple purposes. Demographic economics, by definition, involves the application of economic analysis to demographic data to extract insights that can inform policy-making and address pertinent societal issues. A critical concept within demographic economics is the dependency ratio, which measures the proportion of individuals in the workforce relative to those who are not, typically due to age, whether they be children or the elderly. Such data is indispensable for this field of analysis. The discipline of demographic economics, also known as population economics, examines the implications of demographic changes on various economic aspects. As populations evolve, the needs and demands of different demographic groups shift, affecting the broader economic landscape. Economists analyze statistics such as the crude birth rate, crude death rate, life expectancy, and net migration rates to monitor population dynamics within a specific locale. For instance, an increase in birth rates might suggest favorable economic conditions that encourage family expansion. Conversely, a population decline, caused by higher mortality rates than birth rates, necessitates an investigation into the underlying reasons. Despite intuitive assumptions that a thriving economy should encourage higher birth rates, the demographic-economic paradox presents an intriguing counterpoint: higher economic prosperity is often correlated with lower fertility rates. This paradox highlights the complex interplay between economic success and demographic trends, underscoring the nuanced role of demographic economics in understanding and forecasting economic phenomena (Bloom, Canning, & Sevilla, 2003; Crain, 2023).

Demographic variables have been used as controls or moderating variables in studies on technology use (Cruz-Cárdenas, Zabelina, Deyneka, Guadalupe-Lanas, & Velín-Fárez, 2019). The theory related to demographic factors is of great importance in studying research on personal characteristics. This information is used to define marketing strategies, segment markets, and select target groups. Nessim and Wozniak (2001) provide the meaning of demographic characteristics, which refers to information about individuals such as age, gender, education, occupation, income, religion, and ethnicity. These factors influence consumer behavior and are commonly used as foundational characteristics that marketers consider for market segmentation. These variables are suitable criteria because demographic factors are crucial and clearly measurable indicators in population research, making it convenient for segmentation (Hayes, Potters, & Beer, 2023).

Gender is a significant variable in segmenting the population's preferences and behaviors, as different genders lead to different communication and decision-making behaviors. Marketers often use gender as part of their strategies to target and respond to consumer needs. Age can be used to segment consumer preferences because people of different ages have varying needs and interests. It also influences an individual's ability to comprehend information, with younger age groups often interested in trendy products and older age groups focusing more on health-related products. Education level influences an individual's knowledge, attitudes, and decision-making abilities. People with different education backgrounds have varying needs and preferences, which marketers consider when segmenting markets. Marital Status is also a critical factor. Understanding the number and characteristics of individuals within a household who use specific products is essential for developing suitable marketing strategies. Marital status plays a crucial role in determining family decision-makers, helping tailor marketing strategies effectively. Income reflects economic and social status, indicating the purchasing power of individuals. Marketers use income as a criterion for segmentation to meet the diverse needs of target market groups. Different occupations reflect distinct lifestyles and interests, affecting consumer behavior and product choices (Aksorndee, 2017; Tiplerlerd, 2015).

In a broader context, demographics are essential for businesses to understand population characteristics, including size, distribution, and structure. Key demographic variables, such as gender, age, education level, occupation, and income, provide insights into consumer preferences and purchasing power. These factors help marketers tailor their strategies, segment their markets, and meet the diverse needs of their target audience. Additionally, lifestyle and cultural influences are considered to further understand and compare individual behavior and product preferences, as these aspects vary significantly across the population (Hayes et al., 2023; Hojnik, Ruzzier, Ruzzier, Sučić, & Soltwisch, 2023).

A substantial body of research has consistently demonstrated that demographic factors play a crucial role in shaping an individual's propensity to adopt and utilize technology. Rojas-Méndez, Parasuraman, and Papadopoulos (2017) evaluates the cross-cultural applicability of the Technology Readiness Index (TRI), examining its relevance in diverse cultural contexts. Their research focuses on understanding how demographic factors and individual attitudes contribute to the adoption and use of technology-based products and services. The findings affirm the TRI's validity across different cultures. Interestingly, the study reveals that demographic characteristics, particularly education, play a significant role in determining a person's propensity to embrace new technologies. This aspect is notably consistent across various cultures. The study also uncovers intriguing insights regarding the relationship between attitudes and behaviors concerning technology adoption. In the United States, attitudinal factors, especially a sense of security or insecurity regarding technology, are more influential in predicting pro-technology behaviors. Conversely, in Chile, demographic variables, with education being the most influential, prove to be more effective predictors than attitudinal factors. This challenges the conventional belief in attitude-behavior consistency, highlighting the complex interplay between demographics, attitudes, and technology adoption in different cultural settings. Moreover, Cruz-Cárdenas et al. (2019) undertakes an in-depth examination of the factors influencing the adoption of technology-based products and services in two distinct economic contexts: Ecuador, a developing country in Latin America, and Russia, classified as an emerging economy. The research underscores the pivotal role of demographic variables as determinants of technology usage in both developing and emerging nations. The study identifies key demographic factors - including age, gender, income level, and educational attainment - as critical influencers in shaping individuals' engagement with technology within these regions. These variables not only affect accessibility to technological resources but also dictate the manner in which technology is employed, thereby reflecting the diverse needs and capabilities prevalent among different population segments. This investigation provides valuable insights into the complex interplay of demographic elements and technology utilization in varying economic landscapes. Furthermore, Kraiwanit, Limna, Wattanasin, Asanprakit, and Thetlek (2023) conducts a comprehensive analysis of the determinants influencing the adoption of the Worldcoin digital wallet in Thailand. This research identifies a range of demographic and behavioral variables, including gender, age, educational attainment, occupational status, monthly income, savings, existing digital wallet ownership, frequency of usage, and engagement with social media platforms, as pivotal in shaping the propensity to utilize the Worldcoin wallet. The findings indicate a notable gender disparity, with female participants demonstrating a higher propensity towards wallet usage compared to their male counterparts. Age emerges as a significant factor, with a trend showing decreased adoption likelihood among older demographics. Furthermore, individuals with higher educational backgrounds and those engaged in prestigious professions display an increased inclination towards adopting this financial technology. Contrarily, the study reveals an inverse relationship between higher monthly income levels and the likelihood of adopting the Worldcoin wallet. Additionally, the presence of savings and prior ownership of digital wallets are positively correlated with the intention to adopt the Worldcoin wallet, underscoring the role of existing financial behaviors and tools in influencing new technology adoption.

2.6 Social Media Platform Usage

The rise of digitalization marks a groundbreaking phase in innovation, use, and adaptation of technology. This era is significantly shaped by advancements in fields like AI and social media, which have profoundly altered human life. Moreover, the proliferation of advanced technological interfaces makes it increasingly difficult for individuals to bypass these innovative tools. These interfaces offer enhanced connectivity and flexibility, encouraging users to incorporate these state-of-the-art platforms into their daily routines. Social media, for instance, has been embraced by billions of people globally. Nevertheless, there is a diversity in consumer behavior regarding the adoption, adaptation, and avoidance of new, cutting-edge technologies. Therefore, understanding the ways consumers adapt to modern digital gadgets and applications is crucial. This knowledge aids in market segmentation, enhancing the quality of products or services, and drives innovation in new product development (Appel, Grewal, Hadi, & Stephen, 2020; Geissinger, Laurell, Öberg, & Sandström, 2023; Muhammad, Dey, Kamal, & Alwi, 2021).

Social media encompasses a range of internet-based platforms and websites designed to facilitate a variety of online activities, including the sharing of information, communication, interaction, and collaboration. These platforms empower individuals and groups to produce, modify, and disseminate various forms of content, such as text, images, videos, and audio, with other users within their social networks. This dynamic environment enables users to connect, express themselves, and engage with a broader online community, enhancing the richness of digital interaction (Purnama & Asdlori, 2023). Social media has emerged as a pivotal element in shaping consumer behavior. Platforms like Facebook, Instagram, Twitter, and TikTok have evolved beyond mere promotional tools to become essential spaces for creating brand awareness, enhancing customer engagement, and fostering communities that resonate with brand values. The role of influencers, individuals with significant followings and credibility in specific niches, is especially significant. These influencers have the power to shape opinions, mold preferences, and build trust with their audience, thus playing a vital role in influencing consumer purchasing decisions. In the current era of digital connectivity, the synergy between brands, social media platforms, and influential figures constitutes a complex and dynamic influence, significantly shaping consumer behavior in new and often unexpected ways (Suherlan & Okombo, 2023).

Social media's influence on an individual's inclination to use technology is profound and multi-dimensional. Primarily, it enhances digital literacy; frequent interaction with various platforms boosts confidence and skills in navigating the digital world. This, in turn, often leads to a greater willingness to explore and adopt new technologies. Moreover, social media acts as a powerful conduit for perceived usefulness, showcasing the benefits of different technologies through peer interactions and advertisements. The network effect further amplifies this impact, as the increasing number of users on a platform makes it more essential for others to join, thereby fostering a technology-friendly environment. Additionally, the behavioral reinforcement provided by social media – through likes, comments, and shares – not only encourages more engagement with these platforms but also creates a positive feedback loop for embracing other technological tools. This is coupled with the phenomenon of FOMO (Fear of Missing Out), which drives individuals to stay connected and informed, often through the latest technological means (Abbas, Aman, Nurunnabi, & Bano, 2019; Fraccastoro, Gabrielsson, & Pullins, 2021; Tandon, Dhir, Almugren, AlNemer, & Mäntymäki, 2021; Vahdat, Alizadeh, Quach, & Hamelin, 2021). Social media also serves as a platform for skill development; for instance, creating content can enhance digital design skills, which are transferable to other tech areas. Furthermore, the normalization of technology through its integration into daily life via social media reduces barriers to technology adoption. Lastly, the exposure to new technologies, trends, and innovations through social networks keeps individuals informed and curious about emerging tech, further fueling their intention to use technology. In essence, social media acts as a catalyst, not just in encouraging the use of its own platforms, but in shaping a broader, technology-embracing mindset (Ausat, 2023; Lybeck, Koiranen, & Koivula, 2024; Sarwar et al., 2023; Truong & Diep, 2023).

Numerous studies have confirmed the significant impact of social media on an individual's propensity to adopt and use technology. Muhammad et al. (2021) delves into how cognitive factors like perceived opportunities, social influence, and control, along with affective elements such as enjoyment, self-improvement, trust, and fear, shape both positive and negative adaptive behaviors in social media use, ultimately affecting user engagement on these platforms. This research highlights that consumers' engagement with innovative social media platforms is influenced by a blend of cognitive and emotional attitudes. These attitudes lead to either positive adaptation behaviors, which involve exploring to maximize benefits or exploiting existing features for satisfaction, or negative behaviors, such as avoiding or withdrawing from social media platforms. This complex interplay of cognitive and affective factors plays a crucial role in determining how consumers interact with and adapt to the evolving landscape of social media. Kraiwanit et al. (2023) highlights the profound influence of social media interaction on a person's likelihood to adopt digital wallet technology. An individual's decision to use digital wallets is heavily swayed by their social media experiences. Factors like peer recommendations, educational posts, and attractive promotions on these platforms tend to foster a positive inclination towards digital wallets. On the other hand, exposure to negative experiences or worries about security on social media can act as deterrents. The dual role of social media as both an information hub and a social network is pivotal in shaping attitudes towards embracing this technology.

2.7 Behavioral Intention and Technology Use

Behavioral intentions, particularly in the context of technology or innovation, refer to a user's decision to engage with something new (Chayomchai, Phonsiri, Junjit, & Chanarpas, 2023). This concept is pivotal in understanding how individuals approach and adopt new technological advancements or innovative solutions. It encapsulates the initial inclination or readiness of a user to try out a new technology, often serving as a precursor to actual usage and adoption. Behavioral intentions are shaped by various factors including perceived usefulness, ease of use, and the influence of social and environmental factors, all of which play a significant role in determining whether an individual will move from intention to actual use of the new technology or innovation (Faqih, 2022; Hau, Nhung, & Trang, 2021; Suebtimrat & Vonguai, 2021).

In this study, behavioral intention is a key concept in understanding user engagement with technology, acting as a reliable indicator of how and why individuals adopt and continue to utilize technological tools like ChatGPT and Gemini. This study delves into the intricacies of behavioral intention, particularly in the context of ChatGPT and Gemini, exploring whether these innovations present opportunities or disruptions for future careers. It leverages frameworks like the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), providing a comprehensive analysis of the transition from initial adoption to continuance intention in technology usage. Through these models, the study sheds light on the multifaceted factors influencing users' readiness and sustained interest in embracing these advanced AI technologies.

2.7.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), developed by Davis (1989), serves as a robust framework for understanding how individuals accept and utilize technology (Figure 2.6). TAM has been extensively applied in various studies related to information systems. At its core, TAM focuses on two primary factors: perceived usefulness and perceived ease of use. Perceived usefulness refers to an individual's belief that using a specific technology will enhance their job performance. In essence, if a technology is seen as beneficial, it's more likely to be adopted. Perceived ease of use, on the other hand, denotes the degree to which a person believes that employing a particular technology will be effortless. Technologies perceived as user-friendly are more readily accepted. These two factors greatly influence a person's attitude towards using technology. A positive perception of usefulness and ease of use typically fosters a favorable attitude, which in turn increases the likelihood of technology adoption. This attitude then impacts the behavioral intention to use the technology, which is a significant predictor of actual usage. The final component of TAM is actual system use, where the individual actively engages with the technology. This stage is directly influenced by the behavioral intention to use the technology.

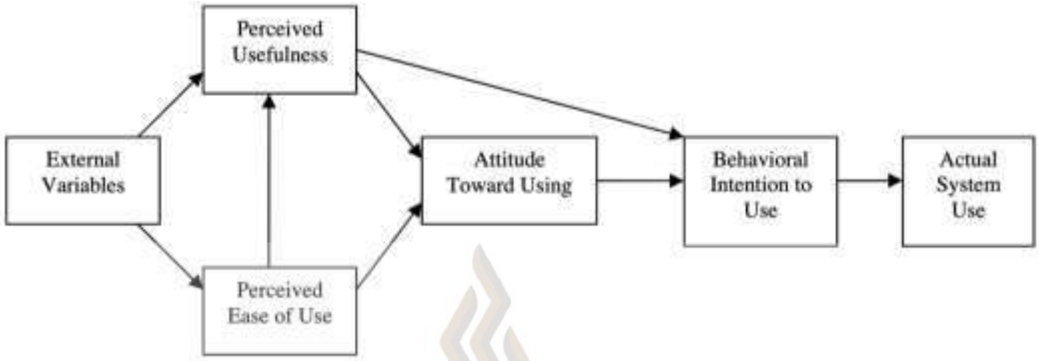

Figure 2.6 Technology Acceptance Model (TAM)
Source: Davis, 1989

The TAM model has been widely applied in various fields, including electronic commerce (e-commerce), electronic learning (e-learning), and workplace information technology (IT) systems. Asanprakit and Kraiwanit (2023) elucidate that the concept of perceived usefulness encapsulates the belief held by users that the application of technology will yield beneficial and successful outcomes. This belief functions as an external motivator, fostering expectations of improved work performance and job alignment, thereby culminating in enhanced efficiency. Concurrently, perceived ease of use is characterized by the users' perception of the degree to which technology facilitates the improvement of their work tasks with minimal exertion. Collectively, these dimensions, in conjunction with users' attitudes towards technology adoption, exert a direct influence on their intentions to select and engage with information systems, a process shaped significantly by their individual experiences.

Wang et al. (2023) contribute to both theoretical understanding and practical applications by integrating the TAM within the e-commerce domain. This research utilizes TAM as a foundational theoretical framework to investigate the enhancement of AI efficacy and profitability in e-commerce, as well as its utility in aiding entrepreneurs to achieve business objectives. The study's outcomes reveal several significant insights. Subjective norms are found to positively influence both perceived usefulness and ease of use of AI in e-commerce. Trust is seen to positively affect perceived ease of use. Moreover, perceived ease of use is observed to have a favorable impact on both perceived usefulness and attitudes toward usage. In a similar vein, perceived usefulness exerts a positive influence on attitudes toward usage and the intention to use AI technology. Interestingly, the study does not corroborate the impact of trust on perceived usefulness or on attitudes toward behavioral intention to use. Finally, a positive correlation is established between the behavioral intention to use and the actual utilization of AI technology in e-commerce settings, indicating a significant link between intention and action in this context.

Saleh, Nat, and Aqel (2022) explore the determinants shaping students' and teachers' receptiveness to sustainable e-learning, and they elucidate the moderating role played by mentality acceptance in the nexus between system trust and interaction, and perceived usefulness and ease of use. The study's findings underscore that all constructs of the TAM exert a significant influence on the behavioral intention to utilize e-learning. Furthermore, it is revealed that mentality acceptance plays a crucial role in moderating the relationships between system trust and interaction, and perceived usefulness and ease of use. The results of this investigation suggest that for educational institutions aiming to foster the adoption and effective use of e-learning services, it is imperative to address factors that influence the attitudes of teachers and students. Key challenges identified include a lack of internet connectivity, insufficient Information and Communication Technology (ICT) skills, and limitations in technology capabilities. These challenges are intertwined with the primary TAM constructs, underscoring their significance in the context of e-learning adoption.

Guo et al. (2023) delve into the utilization of technology by hospitality employees in their professional settings. A key focus of their research is to discern whether the interrelationships among the constructs of the TAM are moderated by variables such as the job level (distinguishing between supervisory and non-supervisory positions) and cultural contexts (comparing eastern and western cultures). The research findings reveal that within the TAM framework, perceived usefulness exerts a more substantial influence on user attitudes and the intention to accept technology compared to perceived ease of use. This suggests that the practical benefits of technology are more critical than its ease of use in shaping attitudes and intentions of hospitality employees towards technology adoption. Additionally, the study uncovers notable differences in the effect sizes of relationships among TAM constructs based on job level and cultural background. Specifically, the associations within the TAM are found to be more pronounced for supervisory employees and in eastern cultural contexts as opposed to their counterparts in non-supervisory roles or western cultures. This insight highlights the influence of organizational hierarchy and cultural factors on technology acceptance and underscores the need for a nuanced understanding of these variables in managing technology adoption in the hospitality industry.

2.7.2 Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT) is a model that explains and predicts user acceptance and use of technology. In the development of the UTAUT, Venkatesh, Morris, Davis, and Davis (2003) amalgamated elements from eight influential theories that had historically been pivotal in elucidating technology acceptance and usage behavior. These include the Theory of Reasoned Action (TRA), which posits that behavior is influenced by behavioral intentions, shaped by attitudes and subjective norms. The Technology Acceptance Model (TAM) is another cornerstone, suggesting that perceived usefulness and ease of use are fundamental determinants of technology adoption. The Motivational Model (MM) shifts the focus to intrinsic and extrinsic motivational factors, while the Theory of Planned Behavior (TPB) extends TRA by incorporating perceived behavioral control. An integrated framework, the Combined TAM and TPB (C-TAM-TPB), merges elements of both TAM and TPB, offering a more comprehensive perspective. The Model of PC Utilization (MPCU) emphasizes the role of factors such as job fit and complexity in personal computer use. The Innovation Diffusion Theory (IDT) examines the spread of new technologies and ideas through social systems and communication channels. The

Social Cognitive Theory (SCT) highlights the significance of observational learning and modeling in technology acceptance. By synthesizing these diverse theories, UTAUT presents a robust and multifaceted framework for understanding and predicting user interactions with technological systems.

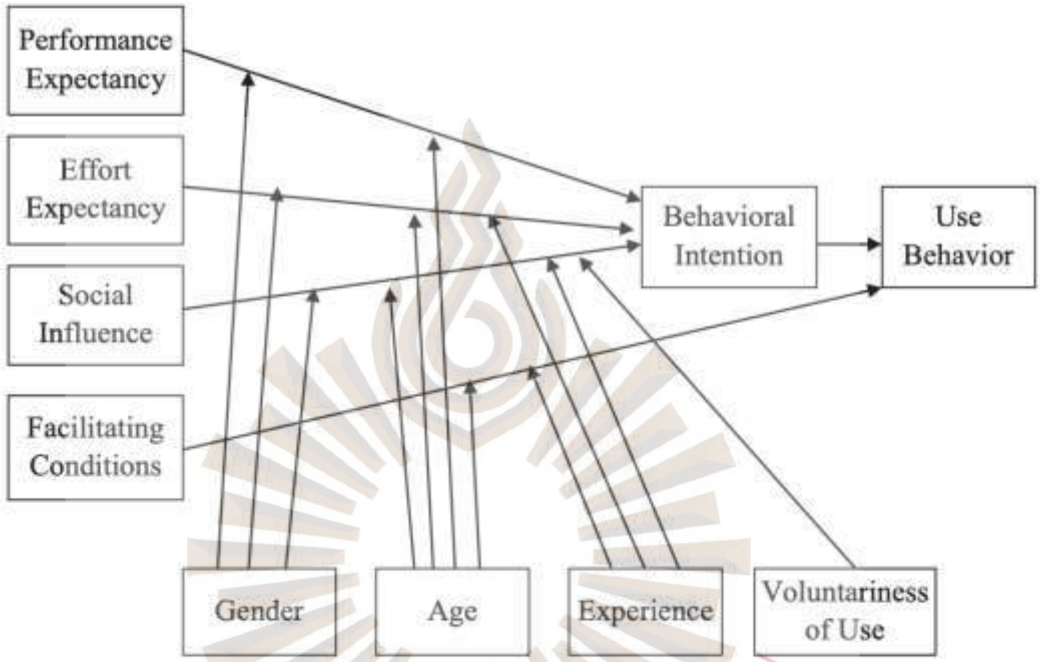

Figure 2.7 Unified Theory of Acceptance and Use of Technology (UTAUT)
Source: Venkatesh et al., 2003

As illustrated in Figure 2.7, UTAUT proposes four key constructs as direct determinants of usage intention and behavior. First, performance expectancy is the degree to which an individual believes that using the technology will help them achieve gains in job performance, akin to the perceived usefulness. Second, effort expectancy represents the degree of ease associated with the use of the technology, including concepts like perceived ease of use. Third, social influence is the extent to which an individual perceives that important others believe they should use the new system. Fourth, facilitating conditions refer to the degree to which an individual believes that an organizational and technical infrastructure supports the use of the system. In addition to these, gender, age, experience, and voluntariness of use are believed to moderate the impact of these four key constructs on user intention and behavior. Each moderating factor can notably influence how the key constructs impact technology acceptance and usage. Gender differences, for instance, significantly affect technology acceptance and use. Research shows that men and women may perceive and value aspects like ease of use and usefulness differently. Men might be more influenced by the perceived usefulness (performance expectancy) of the technology, while women might be more sensitive to ease of use (effort expectancy) and social influence. Age also influences technology adoption and use; younger users are typically more open and adaptable to new technologies, whereas older users might value ease of use more highly and be more influenced by facilitating conditions, as they may require more support and resources to comfortably use new technology. Experience with technology or similar systems greatly influences user perception of new technology. Experienced users are generally less influenced by effort expectancy, as they are likely to find new technologies easier to use, focusing more on performance expectancy and the additional benefits new technology offers over existing solutions. Voluntariness of use, the degree to which the use of the technology is perceived as optional, also plays a role. In mandatory use scenarios, such as in many organizational contexts, social influence can be a stronger factor. Conversely, in voluntary use scenarios, factors like performance expectancy might be more critical, as users evaluate whether the technology is worth adopting based on its merits. These moderators are crucial for understanding the nuances of technology acceptance and usage across different demographic segments and contexts, helping explain why certain technologies are more readily adopted by certain groups and guiding the development and implementation strategies for new technologies (Venkatesh et al., 2003; Tan, 2013).

UTAUT has been widely used and validated in various contexts, making it a robust framework for understanding the adoption of technology in both organizational and consumer contexts. Wang (2016) utilized the UTAUT as a theoretical framework to examine the determinants of technology acceptance among government employees in Taiwan, specifically in the context of e-learning systems. The empirical results of this research provide insightful revelations into the dynamics of e-learning adoption in a governmental setting. Wang found that three core constructs of the UTAUT model—performance expectancy, effort expectancy, and social influence—play a significant role in shaping the behavioral intentions towards e-learning among these employees. Performance expectancy, in this context, pertains to the employees' beliefs about the efficiency gains from using e-learning systems. Effort expectancy relates to the ease of use of these systems, and social influence refers to the degree to which employees perceive that their use of e-learning is endorsed by their peers and superiors. Furthermore, the study indicates a substantial impact of behavioral intention and facilitating conditions on the actual use behavior of e-learning systems. Behavioral intention encapsulates the employees' readiness to engage with e-learning platforms, while facilitating conditions refer to the extent to which an individual believes that organizational and technical support is available to aid in the effective use of e-learning.

Akinnuwesi et al. (2022) assert that the COVID-19 pandemic has accelerated the development and implementation of digital technologies aimed at mitigating the virus's spread. These digital interventions, designed to alleviate the pandemic's devastating effects and enforce preventative measures, have encountered significant challenges in terms of widespread adoption and use by the target populations. Consequently, this research conducts an exploratory analysis to identify the determinants influencing individuals' behavioral intentions towards embracing COVID-19 digital containment technologies, utilizing the UTAUT framework. The study discovers that factors like performance expectancy, facilitating conditions, and social influence predominantly predict the behavioral intention of individuals to adopt these technologies. Additionally, organizational influence coupled with perceived benefits, as well as governmental expectations and advantages, also play a substantial role in shaping these intentions. Contrarily, demographic variables such as age, gender, and voluntary usage do not significantly impact behavioral intentions, possibly due to the nascent stage and limited accessibility of COVID-19 digital containment technologies. The findings suggest that policymakers and regulatory bodies should focus on these key influencing factors — performance expectancy, facilitating conditions, social influence, organizational influence and perceived benefits, along with governmental expectations and advantages — to encourage the adoption and usage of these technologies. Furthermore, it is imperative to raise awareness among the general population about the existence and benefits of COVID-19 digital containment technologies across all communities, ensuring a broader and more effective implementation.

Lu, Colak, and Zhang (2022) delve into the under-researched yet critical domain of incentivizing responsible tourist behaviors within the sustainable tourism paradigm. Recognizing the necessity for a comprehensive precursor framework to responsible tourism behavior, the researchers propose an innovative integration of ration-based and socialization-based motivators. This approach culminates in an expanded application of the UTAUT, coupled with the theory of social influence, to construct an extensive, socialized UTAUT model. This model is designed to elucidate the factors influencing tourists' adoption of responsible behaviors. The proposed model incorporates three key tourism elements: sustainable benefits, accessibility of sustainable facilities, and engagement in social interactions, posited as antecedents. Additionally, it identifies two categories of mediators: ration-based mediators (performance expectation and effort expectation) and socialization-based mediators (informative influence and normative influence). In a robust empirical validation involving a survey of 491 Chinese tourists, the study confirms the efficacy of the model. The findings indicate that all four mediators are instrumental in shaping tourists' responsible behaviors. Specifically, the research highlights that sustainable benefits exert a positive impact on both performance and effort expectations. Moreover, engaging in social interactions enhances the effects of informative and normative influences. Furthermore, the accessibility of sustainable facilities is shown to positively influence both effort expectation and normative influence. These insights contribute significantly to advancing the understanding of motivational dynamics in fostering responsible tourism behaviors.

2.7.3 Initial Adoption to Continuance Intention in Technology Usage

The transition from initial adoption to continuance intention in technology usage is a pivotal journey for users. Initially, users are influenced by factors such as perceived usefulness, ease of use, and social influence, leading them to adopt a new technology. This phase is driven by expectations, curiosity, and the perceived advantages over existing solutions. However, as they become more familiar with the technology, their focus shifts to continuance intention, where long-term usage is determined by different factors: user satisfaction, the technology's practical benefits in daily life, habit formation, and the costs associated with switching to an alternative. In additional, emotional attachment and loyalty can also develop, further anchoring the user's commitment to the technology. This evolution from initial curiosity to enduring usage underscores the importance of not only attracting users with promising features but also retaining them through sustained value and satisfaction (Al-Hattami & Almaqtari, 2023; Ghorbanzadeh & Rahehagh, 2021; Karim, Ilyas, Umar, Tajibu, & Junaidi, 2023; Kelly, Kaye, & Oviedo-Trespalacios, 2023; Lee, Tang, & Jiang, 2023; Mishra, Shukla, Rana, Currie, & Dwivedi, 2023).

In the realm of technology use, enjoyment and satisfaction play pivotal roles in shaping user experiences. Enjoyment is enhanced by factors such as engaging and fun interactions, as seen in video games and social media platforms, along with aesthetically pleasing and intuitive user interfaces. Personalization and customization options further augment this enjoyment by catering to individual preferences. Additionally, technologies that facilitate social interaction fulfill our innate need for connectivity, thereby increasing enjoyment. On the other hand, user satisfaction is driven by the functionality and reliability of technology, emphasizing the importance of speed, accuracy, and consistent performance. Moreover, ease of use, through intuitive design and simplicity, significantly contributes to satisfaction, as does the technology’s utility and effectiveness in meeting users' needs. Ongoing support, updates, and maintenance are also crucial in ensuring long-term satisfaction, along with the accessibility and inclusivity of the technology. Furthermore, the interplay between enjoyment and satisfaction is a key aspect of technology design and user experience, where both elements mutually reinforce each other. Technologies that successfully integrate both enjoyment and satisfaction are more likely to be adopted and recommended, as they effectively meet and exceed user expectations, ensuring both immediate pleasure and long-term utility (Granić, 2024; Hoang & Tan, 2023; Jo & Park, 2023; Kurnia & Sitio, 2023; Masao & Salehudin, 2023; Nuseir et al., 2023; Peters, Calvo, & Ryan, 2018; Sathar, Rajagopalan, Naina, & Parayitam, 2023).

Enjoyment and satisfaction significantly influence users' decisions to continue using technology, each through distinct mechanisms. Enjoyment fosters an emotional attachment to the technology, making users more inclined to use it repeatedly for the pleasure it offers. Satisfaction, on the other hand, enhances the perceived value of the technology. Users are more likely to persist in using a technology they find valuable, whether it saves time, accomplishes tasks efficiently, or simply provides enjoyment. Additionally, when users find enjoyment and satisfaction in their technology use, they tend to promote it through positive word-of-mouth, impacting not only their own continuance intention but also that of their peers. Finally, high satisfaction levels can decrease the likelihood of users switching to alternative technologies. This resistance to change often stems from the perceived effort and uncertainty involved in switching, which may not seem justified when the current technology adequately meets their needs (Foroughi et al., 2023; Jin & Xu, 2021; Yan, Filieri, & Gorton, 2021).

Joo, Park, and Shin (2017) conduct a thorough analysis of the structural relationships among several factors: students' expectations, perceived enjoyment, perceived usefulness, satisfaction, and the intention to continue using digital textbooks in a middle school environment. The study targets Korean middle school students who are engaged in English classes using digital textbooks at E middle school in Seoul. The findings reveal that the fulfillment of expectations regarding digital textbooks correlates positively with students' perceptions of the enjoyment and usefulness of these textbooks. In addition, satisfaction serves as a mediating factor that connects expectations, perceived enjoyment, and usefulness with the intention to continue using the digital textbooks. Perceived usefulness and satisfaction are found to have a direct and positive impact on the intention to continue using digital textbooks. However, perceived enjoyment does not significantly influence the continuance intention to use digital textbooks among these middle school students.

Pereira and Tam (2021) delve into the dynamics of video-on-demand technology, positing that comprehending its evolution and the anticipated outcomes from its sustained usage significantly influences the long-term sustainability of an information system. The research focuses on investigating the behavioral intentions of video-on-demand consumers regarding their continued utilization of the service, with a particular emphasis on the role of enjoyment in influencing this continuance intention. To thoroughly examine the factors contributing to usage continuance, the study employs the expectation confirmation model specifically tailored for information technology, amalgamating it with the principles of the hedonic system adoption model. The findings of the study reveal that satisfaction emerges as the paramount predictor of the intention to continue using video-on-demand services, with enjoyment exerting a substantial influence on satisfaction. Within the context of a hedonic system, enjoyment is conceptualized as the embodiment of positive emotional experiences, which are subsequently converted into a state of satisfaction.

Maduku and Thusi (2023) strive to broaden the scope of post-adoption research in mobile shopping by incorporating hierarchical hedonic and utilitarian value constructs into the expectation confirmation model. The study finds that usefulness, satisfaction, and utilitarian value are significant drivers of this continuance intention, with usefulness emerging as the most influential factor. Intriguingly, while the direct impact of utilitarian value on continuance intention is not substantial, its influence is notably indirect, mediated through usefulness. This finding underscores the mechanism by which hedonic value can foster continuance intention. The study also reveals that both utilitarian and hedonic values are significant predictors of consumers' perceptions of the usefulness of mobile shopping, with hedonic value exerting a more pronounced impact compared to utilitarian value.

2.8 The Theory of Employment and Unemployment

The theory of employment examines how jobs are created, filled, and sustained within an economy, focusing particularly on the dynamics of labor demand and supply. Central to this theory is the debate between classical and Keynesian economics. In classical employment theory, the labor market is viewed as similar to other free markets, governed by the forces of supply and demand. Classical theorists argue that unemployment results from artificial impediments to the market, such as minimum wage laws or union activities, which keep wages above the equilibrium level where supply would equal demand. Employment is thus driven by real wages, productivity, and technological factors that impact labor efficiency. Contrasting sharply with classical views, Keynesian employment theory argues that the labor market does not always adjust quickly to changes in supply and demand, leading to periods of unemployment that are not self-correcting. According to Keynes, the level of employment is primarily determined by the aggregate demand in the economy. In times of low demand, businesses reduce production and employment, leading to further reductions in income and demand in a vicious cycle. Keynes advocated for government intervention through fiscal policies, like increased public spending and tax cuts, to bolster demand, stimulate economic activity, and maintain employment levels (Argoti & Samuleson, 2022; Cruz, 2023; Jo & Park, 2023; Lee, 2023; Suntigul, 2023). Yashiv (2007) further elaborations on employment theory include models like the New Keynesian framework, which introduces concepts of wage and price stickiness that prevent markets from clearing rapidly, and the search and matching theory, which looks at the frictions in the labor market that impede the process of matching workers with jobs. Other perspectives include efficiency wage theory, which posits that higher wages can increase productivity and reduce turnover but may also lead to unemployment if companies reduce hiring to maintain profitability. Together, these theories form a complex picture of the labor market, each offering insights that help explain persistent phenomena like unemployment and wage disparities. For policymakers and economists, understanding these diverse theories is crucial for designing effective interventions that can promote stable and inclusive economic growth (Danthine & Kurmann, 2004; Diamond, 2011; Guerrazzi & Meccheri, 2012; Kryńska & Kopycińska, 2016).

The theory of unemployment delves into the reasons and mechanisms through which unemployment occurs and persists within economies. This theory categorizes unemployment into several types, each explained by different economic conditions and factors. The main types of unemployment recognized in economic theory are cyclical, frictional, structural, and classical, and each type is addressed by distinct theoretical frameworks. Cyclical unemployment is directly related to the economic cycle and predominantly occurs during periods of economic downturns or recessions. Cyclical unemployment arises when there is insufficient aggregate demand for goods and services, leading businesses to reduce their workforce as a means of cutting costs. Keynesian economics offers substantial insight into cyclical unemployment, emphasizing the importance of stimulating demand through fiscal and monetary policies to reduce unemployment levels. Frictional unemployment occurs as a result of the time and processes involved in matching job seekers with appropriate job openings. It is often seen as inevitable and even healthy to a certain extent, reflecting the dynamic nature of labor markets where individuals transition between jobs, careers, or locations. Theories addressing frictional unemployment focus on improving job matching services and labor market efficiency to minimize the duration of unemployment spells. Structural unemployment results from a mismatch between the skills available in the labor force and those demanded by employers. This type of unemployment is often exacerbated by technological change, industry evolution, and geographic disparities. Addressing structural unemployment requires policy interventions aimed at reskilling and up-skilling the workforce, aligning educational and training programs with market demands, and sometimes, incentivizing industries to operate in high-unemployment areas. Classical unemployment, also known as real-wage or supply-side unemployment, occurs when wages are set above the market-clearing level, which can be due to minimum wage laws, labor unions, or other wage-setting practices that do not align with supply and demand dynamics. Classical economic theory suggests that unemployment could be reduced if wages were allowed to adjust freely according to market conditions.

Each type of unemployment presents distinct challenges and necessitates customized policy responses. Economists and policymakers are required to comprehensively understand the underlying causes and attributes of various forms of unemployment to effectively design and implement interventions. The theory of unemployment serves as a critical analytical framework, enabling the formulation of targeted strategies aimed at mitigating unemployment and its detrimental impacts on the economy. This understanding is vital for developing measures that address the immediate symptoms of unemployment and tackle its root causes, thereby fostering long-term economic stability and growth (Begum, 2022; Grainca, 2022; Prasetyo & Cahyani, 2022).

In this digital economy, the swift advancement of technology has ushered in unprecedented changes in the fabric of human history, notably marked by the advent of the big data era and the normalization of “machine substitution.” This technological revolution, characterized by the proliferation of low-cost, high-efficiency AI, has increasingly displaced high-cost labor roles in production sectors. The impact of this shift on employment is significant; empirical evidence suggests that for every 1% increase in robot deployment, approximately 4.6% of jobs are supplanted. Projections for the forthcoming two decades indicate that up to 76% of the workforce is at risk of replacement due to these technological advancements, posing profound implications for labor markets globally. The application of AI profoundly impacts the socioeconomic landscape and has significantly restructured employment patterns, leading to both the displacement of existing jobs and the creation of new opportunities. AI's impact on employment is distinctly polarized; it tends to replace jobs in sectors involving repetitive or low-skill tasks while generating new roles in high-tech and specialized industries. This dichotomy presents a substantial challenge for workers with varying skill levels and educational backgrounds. Low-skilled workers face heightened risks of job displacement, a phenomenon termed “technical unemployment,” which results in increased job insecurity for individuals without the requisite skills to adapt to new technologies. Conversely, AI fosters job creation in domains that leverage its capabilities for innovation, thereby enhancing job prospects in sectors that require high levels of education and expertise. Moreover, the development of AI has profound implications for the nature of work and worker exploitation. The transition from traditional manual labor exploitation to what can be described as “emotional exploitation” in the AI era marks a significant evolution in labor relations. This new form of exploitation arises from increased labor demands in AI research and development, where high-pressure environments and intense workloads are prevalent. Additionally, AI and data analytics have transformed workplace surveillance and performance management, leading to increased psychological stress among workers. This shift reflects a deeper, more insidious form of worker alienation in the digital age, where the psychological impacts are substantial yet less visible. In essence, while AI drives forward technological and economic progress, it also amplifies existing inequalities and introduces complex challenges in labor dynamics. These developments necessitate a thoughtful approach to managing AI's integration into the workforce, including strategies to mitigate its disruptive effects on employment and to harness its potential for creating beneficial new roles (Guliyev, 2023; Mutascu, 2021; Yue, 2023).

According to Global Hola (2024), the swift progression in AI technologies, as epitomized by Gemini and ChatGPT, highlights key advancements in the AI field. These developments necessitate thorough examinations of their potential impacts on job displacement and the dynamics within the workforce. Gemini, characterized by its advanced NLP capabilities, is reshaping interactions between AI and users, potentially altering business operations and daily activities. Concurrently, the pervasive integration of ChatGPT4 across industries highlights the expanding utility of generative AI technologies. This technological evolution brings into focus the potential reconfiguration of job roles, particularly in customer service, data analysis, and content creation. While the efficiency and automation offered by AI suggest a shift in the labor market, there is also a growing discourse around AI's role in augmenting human labor, emphasizing collaboration and skill enhancement. The historical narrative of technological advancement often includes fears of job displacement, yet the current AI landscape offers a nuanced perspective—AI's cognitive abilities present both challenges and opportunities for human-centric roles. The discourse now centers on preparing the workforce for a future characterized by human-AI synergy, stressing the importance of adaptability and upskilling. The interaction between AI innovations like Gemini and ChatGPT and human labor signifies a pivotal moment in understanding AI's impact on the job market. It underscores the need for strategic approaches to workforce development and AI integration, aiming to harness AI's potential as a collaborator and innovator in a way that harmonizes technological advancements with human ingenuity.

A recent survey conducted by Resume Builder (2023) provides an in-depth look at the integration of ChatGPT within the workplace and its implications for employment. Approximately 49% of companies are currently using ChatGPT, with an additional 30% planning to implement the AI technology in the near future. Among the companies that utilize ChatGPT, 48% report that it has replaced workers, highlighting the transformative impact of AI on job roles and structures. The survey further reveals that companies employ ChatGPT for a variety of tasks, including coding, content creation, customer support, and administrative functions like writing job descriptions and responding to applicants. This broad application spectrum underscores ChatGPT's versatility and effectiveness in performing tasks that traditionally required human labor. Financial implications are also significant, as nearly all companies using ChatGPT report cost savings, with 48% saving more than $50,000. This underscores the economic advantage of integrating AI technologies in business operations. Moreover, the expectation for employees to adapt is clear, with 90% of business leaders valuing ChatGPT experience as a beneficial skill for job applicants. This shift indicates a growing need for current employees and job seekers to familiarize themselves with AI tools to remain competitive and relevant in the evolving job market. In summary, the adoption of ChatGPT by businesses is contributing to substantial changes in employment dynamics, job functions, and the skills required in the workforce, while also offering significant cost advantages for companies.

2.9 Case Studies and Real-World Impacts

A concise review on ChatGPT by Gupta, Mufti, Sohail, and Madsen (2023) highlights the remarkable progress in AI technology, particularly in language-based AI tools like ChatGPT, which are finding extensive practical use. The review points out that ChatGPT excels as an effective natural language processing tool, adept at producing text that is strikingly similar to human speech and writing. The deployment of sophisticated AI tools such as ChatGPT offers numerous benefits for businesses and society, including enhanced efficiency in operations, improved accuracy in disseminating information, and significant cost savings. These benefits underscore the growing importance of such technologies in various sectors, ranging from customer support to content creation. However, it is crucial to acknowledge certain limitations, like security concerns and finite capabilities. Despite these hurdles, ChatGPT is evolving quickly as an AI platform, streamlining conversational automation and refining response accuracy. Yet, it is essential to remember that human supervision remains necessary to guarantee that the output aligns with specific quality standards, indicating that it cannot completely replace human writers at present.

George and George (2023) indicate that the transformative effect of AI-based chatbot technologies, such as ChatGPT, across various business domains has been profound. These advanced systems have particularly enhanced the realms of digital marketing and e-commerce by efficiently processing customer queries and delivering tailored responses, informed by user data. This capability has not only fortified customer-business relationships but also augmented long-term sales conversions. Moreover, in the healthcare sector, ChatGPT has been instrumental in offering automated patient support, leading to cost reductions for healthcare providers and enhanced patient outcomes, attributed to more accurate diagnoses and quicker responses to medical inquiries. In the educational field, these AI chatbots are employed to effectively assist students with academic content and university-related questions, thereby enabling educational institutions to allocate more resources towards research and teaching, reducing the time spent on routine administrative tasks. Furthermore, the finance industry is also leveraging these AI solutions. Financial institutions, including banks, are utilizing ChatGPT to facilitate customer interactions with their accounts remotely, while insurance companies are employing it to expedite claim evaluations. In summary, the integration of AI-driven technologies like ChatGPT into diverse business sectors has fundamentally altered organizational operations. These technologies offer substantial competitive edges by enhancing processing speeds and overall efficiency, potentially rendering traditional methods obsolete due to their inferior performance in comparison. Moreover, the widespread adoption of such technologies in daily operations is driven by their significant financial and operational benefits. While human input and tools such as web browsers are crucial in developing reliable and effective AI, there are limitations, particularly in handling complex or novel situations. Although predominantly trained on data up to 2021, these AI models demonstrate considerable advancements in addressing recent developments. However, certain basic requests like real-time information remain beyond their scope due to a lack of contextual understanding. While AI models can propose viable solutions, their developmental nature sometimes affects the accuracy of their outputs.

Zhang (2023) indicates that AI tool, like ChatGPT, has sparked interest and investment in large language models by businesses and healthcare professionals. This technology presents new opportunities for librarians to deepen their understanding of language model development and their impact on information communication. By staying informed on language models, librarians can better evaluate the quality of AI outputs, ensure users' rights are protected, and curate data policies for patrons' research activities involving language models. As language models continue to evolve, it is critical for librarians to remain vigilant in adapting their skills to best serve their patrons' needs in this rapidly changing information landscape.

According to Sardana, Fagan, and Wright (2023), ChatGPT is considered a disruptive innovation as it challenges the existing norms in scientific, academic, medical, dental, health, and social standards surrounding the creation of original work and documents. However, it also has the potential to disrupt the traditional means of innovation originating solely from human minds. As the field of chatbots continues to evolve, more players and competitors, such as Google's Bard and Microsoft's products, will emerge. Therefore, while ChatGPT is undoubtedly useful and time-saving, it is necessary to revisit the guidelines and recommendations used by academic journals, university committees, educational institutions, and other stakeholders to establish the appropriate tolerance limits between ethical norms and academic misconduct. There is a pressing need to address this issue and ensure that ethical standards are maintained while embracing technological advancements.

In the realm of medical research, where impeccable adherence to research integrity is paramount, the study by Aiumtrakul et al. (2023) serves as a critical evaluation of the citation accuracy provided by emerging AI tools, specifically within the discipline of Nephrology. The research focused on comparing the precision of citations generated by AI platforms such as ChatGPT, Bing Chat, and Bard AI. This involved the generation of prompts for each AI tool to elicit 20 references in the Vancouver citation style across 12 Nephrology topics. The verification of the references' existence and accuracy was meticulously conducted using established databases such as PubMed, Google Scholar, and Web of Science. A classification system was employed to categorize the validity of the references from the AI chatbots, delineating them as (1) incomplete, (2) fabricated, (3) inaccurate, and (4) accurate. The study's findings revealed a notable variance in citation accuracy among the AI platforms. ChatGPT yielded 199 unique references, with 76 (38%) being accurate, 82 (41%) inaccurate, 32 (16%) fabricated, and 9 (5%) incomplete. Bing Chat provided 158 references, of which 47 (30%) were accurate, 77 (49%) inaccurate, 21 (13%) fabricated, and 13 (8%) incomplete. Bard AI, on the other hand, offered 112 references, with only 3 (3%) accurate, 26 (23%) inaccurate, 71 (63%) fabricated, and 12 (11%) incomplete. A common error across these platforms was the provision of incorrect DOIs. The outcomes underscore the varying degrees of citation accuracy among different AI tools. While some results were promising, the discrepancies observed necessitate a cautious approach and rigorous validation of AI-sourced references in the medical field. Before these chatbots can be integrated as standard tools in medical research, substantial enhancements are required to ensure the unwavering accuracy of their outputs, aligning with the strict standards of research integrity in medicine.

Zarifhonarvar (2024) concludes that the adoption of generative AI technologies like ChatGPT is anticipated to have both positive and negative consequences on the job market. While AI may generate new employment opportunities and boost productivity and economic growth, it is also likely to lead to the displacement of workers, particularly those in routine jobs. This displacement can result in unemployment, declining wages, and rising income inequality. The impact of AI on the labor market is influenced by several economic and social factors, including the availability of reskilling and upskilling opportunities for employees. This study found that AI technologies may impact a significant portion of the workforce in the future, with 32.8% of occupations facing a Full Impact, 36.5% experiencing a Partial Impact, and 30.7% having no impact. The study highlights the need for governments, businesses, and workers to prepare for the impacts of AI on the labor market and take proactive steps to ensure that the benefits of AI are shared widely and that workers are able to transition to new roles as needed. The incorporation of AI technologies like ChatGPT can increase productivity and efficiency, but it is crucial to address the potential negative consequences and mitigate any harmful effects on the job market.

Hallal, Hamdan, and Tlais (2023) posit that artificial intelligence (AI) chatbots, such as ChatGPT and Bard, constitute an invaluable resource for students, significantly enhancing their capabilities in problem-solving, summarization, and promptly responding to inquiries. These tools are distinguished from conventional educational resources due to their accessibility and immediate response mechanism. In the realm of academia, it is imperative for educators to undertake a thorough and collective assessment of the applicability and effectiveness of such chatbots across varied educational disciplines before their extensive integration into the student learning process. The research underscores the necessity to meticulously examine and contrast the proficiency of these AI chatbots, particularly in their understanding and interpretation of structural notations in organic chemistry, including condensed structures, International Chemical Identifier (InChi), and Simplified Molecular Input Line Entry System (SMILES). For students, acquiring a robust comprehension of these organic structures is crucial for mastering the intricacies of organic chemistry. A lack of understanding in this area can lead to significant challenges in accurately addressing aspects such as IUPAC nomenclature and functional groups, further impacting their ability to tackle complex questions related to organic reactions, mechanisms, and aspects of organic synthesis and spectroscopic analysis. Similarly, the ability of AI chatbots to accurately interpret these organic structures is integral to their effectiveness in providing correct and relevant information. This capability is essential for them to effectively assist in responding to inquiries pertaining to organic chemistry.

Limna and Kraiwanit (2023) highlight the significant positive impact of ChatGPT on customer service in the hospitality industry, as evidenced by qualitative data from interviews with front-line employees, managers, and stakeholders. The findings reveal that ChatGPT enhances workers' skills and knowledge, aiding in customer service, industry best practices, and language skills, thereby improving the handling of customer inquiries and issue resolution. It is particularly effective in overcoming language barriers through translation services and real-time interpretation, enhancing communication with guests from diverse linguistic backgrounds. ChatGPT also benefits hospitality workers by providing recommendations for travel, local attractions, and entertainment, improving guest experiences and satisfaction. It assists with productivity and workflow management by helping with scheduling, task prioritization, and administrative tasks, allowing employees to focus more on guest service. However, the integration of ChatGPT into the hospitality industry requires addressing challenges like ensuring accuracy, avoiding bias, and maintaining appropriate responses through training and monitoring. Therefore, it is essential for hospitality establishments to set clear AI usage guidelines, regularly review interactions, and seek feedback to balance automation with the human element in service, ensuring ethical standards and data privacy. By managing these aspects, the industry can maximize the benefits of ChatGPT while maintaining high service and ethical standards.

In an innovative study by Cheong et al. (2023), the effectiveness of patient education materials on obstructive sleep apnea (OSA) generated by the AI chatbots, particularly ChatGPT and Google Bard, was compared. This marked the first head-to-head evaluation of these tools in the context of patient education. The methodology involved using fifty common OSA questions from leading sleep organizations as prompts for both chatbots. Two otolaryngologists with specializations in sleep medicine and surgery independently assessed the responses using the PEMAT-P Auto-Scoring Form. Additionally, the readability was analyzed using the Flesch-Kincaid Calculator. The results revealed that ChatGPT outperformed Google Bard in terms of understandability and actionability across all domains, including condition, investigation, and treatment, with no incorrect or dangerous information identified in either chatbot's responses. This comparison highlights ChatGPT's superior ability in providing effective and understandable patient education materials for OSA, underscoring its potential utility in medical communication.

This research by Mason (2023) aims to assess the feasibility of employing LLMs as conversational entities in qualitative investigations within the realm of computer science education. The methodology involved conducting semi-structured dialogues with three distinct LLMs: Bard, OpenAI's ChatGPT, and GPTSchule. These interactions yielded insightful observations, albeit with an acknowledgment of the inherent limitations and biases associated with utilizing LLMs in such scholarly pursuits. The study illuminates that LLMs could act as preliminary tools for garnering exploratory insights into specific thematic areas. These models are capable of generating a diverse array of responses. Nonetheless, to bolster the validity and reliability of the findings, it is imperative to execute multiple iterations of identical interviews. Interviewers can refine the responses and mitigate potential biases by introducing queries with prefatory phrases like “In your opinion...” or “Please assume the role of...”. Despite these strengths, the study identifies significant constraints in LLMs, particularly in producing precise, contextually rich answers. In specific pedagogical inquiries, LLMs exhibited a tendency towards generality, often lacking inventive perspectives on the dynamically evolving nature of teaching methodologies. The absence of authentic world experiences and cognizance of particular educational frameworks curtails the generalizability of their responses. This issue is especially pertinent in the context of generating authentic responses, as noted by Sobieszek and Price (2022), who argue that the seeming nonsensical nature of GPT's answers stems from its design not to prioritize truth-telling but rather to optimize for plausibility over veracity to fulfill its objective function. Furthermore, the investigation of the study illuminates the ethical considerations inherent in the use of LLMs in qualitative research. These AI systems, being trained on extensive datasets, may harbor biases that could inadvertently color their outputs. It is incumbent upon researchers to approach the analysis of such data with a critical lens, to avert the propagation of these biases. Consequently, the study advocates for a judicious application of LLMs as preliminary investigative instruments. Researchers should not depend exclusively on responses generated by LLMs; rather, they should integrate these with conventional qualitative methodologies that involve human subjects. Such an approach allows the amalgamation of AI-driven insights with the richness and contextual depth characteristic of human experiences.

Qarajeh et al. (2023) evaluates the performance of four AI models in identifying potassium and phosphorus content in foods commonly recommended for chronic kidney disease (CKD) patients. The models tested were ChatGPT 3.5, ChatGPT 4, Bard AI, and Bing Chat. A total of 240 food items from the Mayo Clinic Renal Diet Handbook were used for evaluation, with 149 items for potassium and 91 for phosphorus content. The AI models were tasked with categorizing these foods as high or low in potassium and high in phosphorus, and their results were compared to the handbook's recommendations. Model consistency was also assessed. Among the models tested, ChatGPT 4 demonstrated the best performance in identifying potassium content, correctly classifying 81% of the foods. It accurately identified 60% of low potassium foods and 99% of high potassium foods. ChatGPT 3.5 had a 66% accuracy rate, while Bard AI and Bing Chat both had an accuracy rate of 79% and 81%, respectively. For phosphorus content, Bard AI achieved a perfect 100% accuracy rate. ChatGPT 3.5 and Bing Chat correctly identified 85% and 89% of high phosphorus foods, respectively, while ChatGPT 4 registered a 77% accuracy rate. This study highlights the varying accuracy of AI models in discerning potassium and phosphorus content in foods suitable for CKD patients. ChatGPT 4 showed significant improvement over its predecessor, especially in detecting potassium content, while Bard AI excelled in identifying phosphorus content. AI models have the potential to be valuable tools in renal dietary planning, but further refinements are needed for optimal utility.

Chapter 3

Methodology

This chapter delineates the methodology employed throughout the research. Initially, the research strategy is outlined, serving as the guiding framework for the study. The chapter describes the sampling plans and the population under consideration. Following this, the methodology for data collection is articulated, alongside the design of the research instrument employed to gather data. Lastly, the approach to data analysis is detailed, explaining how the collected data will be processed and interpreted to fulfill the research objectives. The structure of the chapter is organized as follows:

3.1 Research Strategy

3.2 Sample and Sampling Technique

3.3 Research Instrument

3.4 Data Collection

3.5 Data Analysis

3.1 Research Strategy

This study adopted a mixed-methods approach as its research strategy. A mixed-methods approach represents an independent research methodology with its distinct philosophical assumptions and inquiry methods. It encompasses a research design that incorporates these assumptions to guide the collection and analysis of data from multiple sources within a single study (Dawadi, Shrestha, & Giri, 2021). Mixed methodology, as a research strategy, involves the intentional integration of both quantitative and qualitative research approaches within a study. This strategy combines elements of quantitative research, which centers on numerical data and statistical analysis, with qualitative research, which focuses on subjective experiences, meanings, and interpretations (Harrison, Reilly, & Creswell, 2020).

A quantitative approach is a systematic and empirical method of studying a phenomenon using measurable data and statistical analysis. It involves the collection and analysis of numerical data to draw conclusions, make predictions, and identify patterns or relationships. In a quantitative approach, researchers typically define research questions or hypotheses and then design studies to gather relevant data. They use various methods to collect data, such as surveys, and convert variables into numerical data. This data is often collected from a representative sample to generalize findings to a larger population. Statistical analysis is a key component of the quantitative approach (Bergin, 2018; Mohajan, 2020). The quantitative approach is a valuable research method for studying phenomena that can be measured and analyzed numerically. It provides a structured and rigorous framework for conducting research and generating empirical evidence (Ali & Bhaskar, 2016; Mulisa, 2022).

A qualitative approach involves collecting, analyzing, and interpreting non-numerical data to gain an understanding of the underlying meanings, patterns, and subjective experiences of individuals or groups. It focuses on exploring and interpreting social phenomena in their natural settings, allowing for an in-depth exploration of complex topics. Qualitative research is often used when studying subjective aspects such as perceptions, attitudes, beliefs, motivations, and experiences. It provides rich and detailed data that can offer insights into the context, processes, and dynamics of a particular phenomenon (Antwi & Hamza, 2015; Mohajan, 2018; Taherdoost, 2021).

3.2 Sample and Sampling Technique

For a quantitative approach, the study's population consisted of ChatGPT and Gemini users over 18 years of age in Thailand, and the sample group comprised ChatGPT and Gemini users over 18 years of age in Thailand, who were selected through convenience sampling. Convenience sampling, often referred to as grab, accidental, or opportunity sampling, is a method in which a sample is drawn from segments of the population that are immediately accessible and convenient to the researcher. This non-probability sampling technique is commonly used when researchers opt to collect data from a readily available pool of respondents, due to its practicality and ease of implementation (Obilor, 2023). The size of the sample group was determined by calculating the sample size using Cochran's formula (1977) at a 95% confidence level with a margin of error of ± 5%.

The formula includes:

$$n = \frac{P(1-P)z^2}{d^2} \tag{3-1}$$

Where

n = The desired sample size,

P = The population proportion of interest to the researcher (0.5),

Z = The confidence level set by the researcher at a statistical significance level. At a statistical significance level of 0.05, the value is 1.96 (95% confidence),

d = The proportion of acceptable margin of error (0.05).

Substitute the values into the formula:

$$n = \frac{0.50(1-0.05)1.96^2}{0.05^2}$$

$$n = \frac{0.25(3.8416)}{(0.0025)}$$

$$n = \frac{0.9604}{0.0025} = 384.16 = 385$$

By substituting these values into the formula, the minimum sample size required for data collection was approximately 385 people, with an acceptable margin of error of 5%. In order to bolster the study's methodological robustness and address potential issues related to data loss or non-responses, an initial participant cohort of 1,275 individuals was established through the utilization of convenience sampling. This methodological approach facilitated the acquisition of a diverse array of data from respondents meeting the study's predefined criteria. Subsequent to data collection, a refinement process, inclusive of data cleansing techniques, was applied to the dataset, resulting in the isolation of 1,159 respondents who had successfully completed and passed the online multiple-choice test and confirmed their usage of ChatGPT and Gemini. This iterative refinement process was instrumental in ensuring that the subsequent data analysis remained closely aligned with the primary focus of the study.

For a qualitative approach, purposive sampling was used as the sampling method. Purposive sampling is a non-probability sampling technique utilized by researchers who select subjects that specifically meet the objectives of their study, based on their own judgment and understanding of the study's context. This method, also known as subjective or judgment sampling, is particularly prevalent in qualitative research. Researchers use purposive sampling primarily to acquire in-depth insights into a specific phenomenon rather than to generalize findings statistically, or in cases where the target population is small and distinctly defined. The effectiveness of purposive sampling hinges on the clear establishment of criteria and rationale for participant inclusion. When appropriately executed, this sampling method enhances the relevance of the data collected by excluding responses that do not align with the research objectives, thereby potentially reducing the margin of error associated with data collection (Obilor, 2023). In short, purposive sampling is a qualitative research technique in which researchers choose the most useful sample based on their expertise. Its goal is to comprehend everything there is to know about a particular phenomenon or population (Khoa, Hung, & Hejsalem-Brahmi, 2023; Sukmawati, Salmia, & Sudarmin, 2023). In alignment with Thailand’s national AI strategy and action plan, as outlined by Wutiwiwatchai (2022), which specifies ten key sectors for development, purposive sampling was employed to selectively focus on two specific sectors: education, and the creative economy and tourism. The selection of education, and the creative economy and tourism as focal sectors for the study was strategic, given their potential for transformative impacts through AI integration. In education, AI can significantly enhance personalized learning, streamline administrative processes, and provide predictive insights into educational outcomes. For the creative economy and tourism, AI facilitates innovative content creation and improves visitor experiences through personalized services and augmented realities. These sectors are pivotal for economic and cultural development, making them ideal for examining how AI tools like ChatGPT and Gemini can drive technological advancement and economic growth. This strategic selection enabled a more profound exploration of areas where AI's impact could be most transformative. By concentrating on these sectors, the study aimed to uncover the unique challenges and opportunities AI introduces, particularly how it can enhance educational systems and stimulate the creative and tourism industries. Furthermore, the research sought to assess the overall impact of AI technologies like ChatGPT and Gemini on economic aspects and future career development within Thailand's digital economy. This methodology ensures that the findings are not only relevant but also critical to sectors that are pivotal for national development and stand to gain significantly from AI integration. According to Hennink and Kaiser (2022), a minimum of 12 interviews appears to be the optimal number for achieving data saturation in qualitative research. Thus, the participants were 20 Thai individuals who used ChatGPT and Gemini. To qualify for participation in the study, individuals were required to meet the specific inclusion criteria: 1) they must be at least 18 years old; 2) they must be Thai residents living in Thailand; 3) they must have a minimum of five years of active involvement in either education or the creative economy and tourism sectors; and 4) they must possess recent knowledge and experience in using ChatGPT and Gemini. A Short screening interview with each participant was conducted to verify their experience, role, and willingness to participate. These processes and criteria ensured that participants were not only demographically representative of the broader Thai population but also directly engaged in the key sectors under study, thereby providing relevant insights into the implementation and effects of AI technologies within these fields.

3.3 Research Instrument

In adopting a quantitative approach, online questionnaires were conducted. The researcher employed content validity testing, a method to assess the accuracy of questions by calculating the Index of Item Objective Congruence (IOC). This involved sending the questionnaire to three experts in the relevant field for consideration of content accuracy. The aspects evaluated included the clarity of the questions, their relevance and appropriateness for measuring variables, and the suitability of the language used. This was done to guide the development and improvement of the questionnaire, ensuring its appropriateness. The scoring criteria for reviewing the questions were as follows:

Score +1 if confident that the item accurately measures the objective.
Score 0 if unsure whether the item accurately measures the objective.
Score -1 if confident that the item does not accurately measure the objective.

The calculation is made using the formula:

$$IOC = \frac{\sum R}{N} \tag{3-2}$$

Where IOC = The Index of Congruence,
R = The score given by each expert,
ΣR = The sum of the scores given by the experts, and
N = The number of experts.

Questions with an IOC value between 0.50 and 1.00 are considered to have satisfactory content validity and are appropriate for measuring the studied variables. Questions with an IOC value below 0.50 need to be revised or removed due to their lack of content validity (Rovinelli & Hambleton, 1976). Notably, this study achieved IOC values ranging from 0.80 to 1.00. These values confirm the high level of appropriateness of the questionnaire in terms of its context, language, and structural coherence. This validation process ensures that the instruments used are relevant and accurately tailored to the specific context of the study, thereby enhancing the reliability and precision of the data collected. Such robust IOC scores are indicative of a well-constructed research framework, capable of effectively capturing nuanced insights relevant to the adoption and impact of ChatGPT and Gemini within the Thai demographic.

The online questionnaires were segmented into four distinct sections. The initial section provided an in-depth exploration of demographic variables, including gender, age, education, marital status, income, and an analysis of engagement trends across social media platforms such as Facebook, Instagram, X (formerly Twitter), TikTok, and YouTube. The second section comprised ten multiple-choice questions regarding participants' knowledge of information technology, ChatGPT, and Gemini. The third section conducted a comprehensive examination of participants' awareness and understanding of ChatGPT. It explored concerns about ChatGPT's potential to automate roles in sectors such as interpretation, translation, customer support, content creation, librarianship, and education. Simultaneously, it highlighted optimistic views of ChatGPT as a catalyst for career progression, assessing its utility in tasks such as resume drafting, innovative content generation, demystifying coding processes, and essay composition. This section also evaluated respondents' readiness to integrate ChatGPT into their professional lives, focusing on its role in skill enhancement, knowledge acquisition, efficiency improvement, motivation boosting, and overall satisfaction in meeting career aspirations and forging new opportunities. The fourth section mirrored the third but shifted focus to Gemini. It delved into participants' comprehension of and attitudes toward Gemini, paralleling the assessment of ChatGPT in terms of potential job displacement concerns and its perceived benefits for professional development. It also gauged the respondents’ willingness to embrace Gemini in their careers, evaluating its impact on professional skill development, learning new concepts, enhancing work efficiency, fostering motivation, and overall contentment with its integration in fulfilling career requirements and opening up new vistas of opportunity in the digital economy.

In adopting a qualitative approach, in-depth interviews were conducted with 20 Thai individuals who possessed recent knowledge of and experience in using ChatGPT and Gemini. These interviews aimed to comprehensively analyze the impacts of these AI technologies across various sectors. The qualitative research was methodically designed to fulfill multiple primary objectives. Initially, it aimed to investigate the acceptance and usage intentions related to AI technologies, with an emphasis on assessing key factors such as skill development, learning enhancement, efficiency improvement, fulfillment of career demands, opportunity creation, and overall satisfaction with these technologies. Additionally, the study critically examined reactions and attitudes towards AI technologies, specifically ChatGPT and Google's Gemini. This evaluation encompassed an analysis of concerns and disruptions reported by respondents about the impact of these AI tools on career trajectories within sectors such as customer service and education. Moreover, the research explored positive perceptions of AI as providing significant career opportunities, particularly highlighting its potential to aid in tasks such as content generation and essay writing. Finally, the study explored the overarching impact of ChatGPT and Gemini on the economic landscape and the future of career development within the digital economy. Each interview was carefully structured to elicit in-depth and reflective responses, aiming to capture a diverse array of perspectives and provide a multi-dimensional view of the future of work in an AI-driven landscape. Interviewees were prompted with open-ended questions that encouraged them to reflect on both the immediate and long-term effects of AI tools like ChatGPT and Gemini on their professional lives and industries. The detailed enumeration of interview questions is provided in the Appendix section.

3.4 Data Collection

For the quantitative approach, closed-ended questionnaires were administered to collect data. These questionnaires were designed to elicit specific, measurable responses suitable for statistical analysis, thereby establishing a solid quantitative analysis framework. The online closed-ended questionnaires were developed utilizing Google Forms to facilitate data collection. These forms were specifically designed to ensure clarity and ease of use for participants. To reach a broad and diverse respondent base, the questionnaires were distributed via popular social media platforms, including LINE, Facebook Messenger, and WhatsApp. These platforms were chosen due to their widespread use among the target demographic, enhancing the potential for high response rates and ensuring a representative sample of the population under study. The data collection process was meticulously planned and executed over a two-month period, between April and May 2024. This timeframe was selected to provide sufficient opportunity for comprehensive data gathering and to facilitate the analysis of temporal trends within the collected data. Additionally, this period coincided with the projected availability of the target demographic, thereby maximizing response rates and ensuring a representative sample. The data collected were crucial for drawing empirical conclusions that are grounded in statistically significant findings.

For the qualitative approach, in-depth interviews were conducted in May 2024. In-depth interviews are a recognized qualitative research method designed to collect detailed and nuanced information from individuals or groups. These interviews are structured yet flexible conversations between the researcher and participants, aimed at exploring their perspectives, experiences, and attitudes towards a specific topic. This method allows for a deep exploration of complex issues and provides rich, qualitative data (Rutakumwa et al., 2020; Swain & King, 2022). To prepare for these interviews, a thorough review of secondary data was undertaken. This review helped in formulating key survey questions that were both relevant and targeted, ensuring that the interviews would yield comprehensive insights into the study's main areas of interest. The in-depth interviews also utilized the documentary method, a technique that involves systematic cataloging, analysis, and interpretation of documentary evidence to supplement spoken or written sources. This method was employed to corroborate and enhance the primary data collected, thereby enriching the overall findings of the research.

Ethical considerations were of utmost importance in the data collection processes of this study. Several ethical principles were adhered to in order to ensure the well-being and privacy of the participants. Informed consent was obtained from all participants, providing them with a clear understanding of the purpose, procedures, and potential risks and benefits of their involvement. Confidentiality was maintained by assigning pseudonyms to the participants and securely storing all data, ensuring that their identities remained anonymous. Participants were given the right to withdraw from the study at any point without facing any negative consequences. Data were analyzed and reported in an aggregated and anonymized manner to protect individual privacy.

The study adhered to ethical guidelines and regulations, demonstrating a commitment to respecting the rights and well-being of the participants involved. This research underwent a comprehensive review process and received formal approval from the Ethics Review Board of Rangsit University, evidenced by Certificate of Approval No. RSUERB2023-105. The Board evaluated the research methodologies and ethical considerations in accordance with established guidelines to ensure compliance with academic standards and ethical norms. The certificate of approval is included in the Appendix section. This endorsement by the Board signifies that the research adheres to the ethical standards required for academic rigor and integrity.

3.5 Data Analysis

In a mixed-method approach to data analysis, the study's quantitative data were statistically analyzed, employing binary regression to identify patterns and relationships within the dataset. For the study's qualitative data, a combination of content analysis and NVivo software was employed. Content analysis provided a systematic method for interpreting textual data by identifying themes and patterns, while NVivo enhanced this process by efficiently organizing, analyzing, and visualizing the data. This approach ensured a comprehensive and robust analysis, combining the strengths of both quantitative and qualitative methodologies.

3.5.1 Quantitative Data Analysis

Prior to conducting any statistical analyses, the collected data were thoroughly examined to identify any instances of missing values, careless responses, and statistical outliers. To mitigate the issue of missing responses, it was mandatory for respondents to provide answers to each item on the questionnaire. In instances where a respondent did not complete all questions, their responses were not submitted. Consequently, the dataset contained no missing data. Quantitative data were subjected to statistical analysis to uncover patterns and relationships within the dataset. Statistical software was employed for data analyses, facilitating a thorough examination of the variables involved. Binary regression was specifically employed to analyze the data. The collected data were analyzed using both descriptive and inferential statistics. Descriptive statistics, including frequencies and percentages, were used to summarize the demographic characteristics of the participants. Inferential statistics, which included chi-square tests and logistic regression, were employed to explore associations and make predictions concerning the outcome variable based on the predictor variables. Logistic regression analysis was conducted to investigate the relationship between the predictor variables and the outcome variable. Initially, a baseline model was established with only the constant term. Subsequently, additional predictor variables were incorporated into the model to assess their contributions to the prediction of the outcome variable. The performance of the logistic regression models was assessed using various statistical measures, such as classification tables. These measures aided in evaluating the fit of the models, the overall predictive capability, and the accuracy percentage of the predictions. Descriptive statistics were utilized to furnish a comprehensive overview of the sociodemographic characteristics of the sample group. These statistics elucidated perceptions of ChatGPT and Gemini as potential threats to various careers, perceptions of these AI tools as opportunities for future careers, and the acceptance and intention to use these technologies within one's professional trajectory. The study’s results were presented in tabular form, including percentages, frequency distributions, means, and standard deviations, utilizing pre-established statistical analysis tools.

Percentage and Frequency Distribution

$$P = \frac{F}{N} x100 \tag{3-3}$$

Where: P = Percentage

F = Frequency (to be converted into percentage)

N = Total frequency count

Mean (Average)

$$\overline{X} = \frac{\sum x}{N} \tag{3-4}$$

Where: $\overline{X}$ = Mean

Σx = Sum of all scores

N = Total number of sample groups

Standard Deviation

$$S.D. = \sqrt{\frac{n\Sigma x^2 - (\Sigma x)^2}{n(n-1)}} \tag{3-5}$$

Where: S.D. = Standard Deviation

X = The score of the sample group

n = Number in the sample group

Σx^2 = Sum of squares of the sample group

$(\Sigma x)^2$ = Sum of all scores squared

Binary Logistic Regression Analysis Model

The analysis conducted is a Binary Logistic Regression Analysis Model, where variable values are denoted as Y, taking on two forms: Y = 0 (no event occurs) and Y = 1 (an event occurs). The relationship between the independent variable, denoted as X, and Y in this analysis exhibits an S-shaped pattern, as follows:

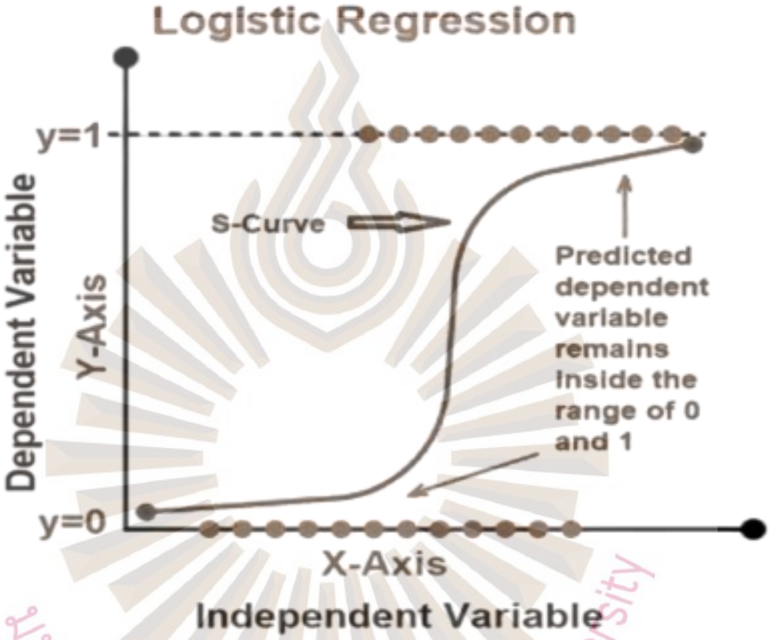

Figure 3.1 Binary Logistic Regression Analysis Model

Source: Achu, 2023

Case 1 - Single Independent Variable

In the case of Simple Regression Analysis with only one independent variable, the equation can be represented in linear form. The details are as follows:

$$Y = \beta_0 + \beta_1 x + \varepsilon \tag{3-6}$$

For the analysis described above, when Y can take on two values, the relationship between X and Y is observed to be non-linear and follows the form:

$$P(Y) = \frac{e^{\beta_0 + \beta_1 x}}{1 + e^{\beta_0 + \beta_1 x}} \tag{3-7}$$

Case 2 - Multiple Independent Variables

In the analysis mentioned above, equations with more than one independent variable take the following form:

$$P(y) = \frac{e^{b_0 + b_1 x_1 + \ldots + b_p x_p}}{1 + e^{b_0 + b_1 x_1 + \ldots + b_p x_p}} \tag{3-8}$$

Where: P(y) = Probability of an event occurring

Q(y) = Probability of an event not occurring

Q(y) = 1 - P(y)

P(y) greater than or equal to 0.5 indicates that an event occurs. P(y) less than 0.5 indicates that an event does not occur. Generally, 0.5 is commonly used as a threshold for data classification.

The odds ratio (OR) represents the likelihood of an event occurring compared to the likelihood of it not occurring. If the odds value is greater than 1, it indicates that the likelihood of an event happening is higher than the likelihood of it not happening.

$$OR = \frac{P(y)}{Q(y)} \tag{3-9}$$

Logistic regression models are often expressed in the form of the log of the odds, known as Logit or Logistic Response Function. It is written in the equation as:

$$\log(odds) = \log\left(\frac{P(y)}{Q(y)}\right) \tag{3-10}$$

or $$\log(odds) = b_o + b_1 x_1 + ...b_p x_p$$

Testing the Significance of Logistic Regression Coefficients

Testing the significance of logistic regression coefficients is an important step in understanding the relationship between independent variables and the probability of a binary outcome in logistic regression analysis. It helps determine whether a particular independent variable has a statistically significant impact on the outcome variable.

Wald Statistic

The Wald Statistic is used to test the hypothesis that the coefficient of the independent variable is not equal to 0. The Wald Statistic follows a Chi-Square distribution under the null hypothesis. The statistic follows a Chi-Square distribution with 1 degree of freedom since a single parameter (the coefficient) is being tested. The Chi-Square distribution is appropriate in this context to assess how well the observed data aligns with the hypothesized model under the null hypothesis. The Chi-Square distribution is a positively skewed distribution and depends on the degrees of freedom. The shape of the Chi-Square distribution becomes more symmetric as the degrees of freedom increase. To assess the significance of the coefficient estimate, the Wald Statistic is compared to the Chi-Square distribution table (or a statistical software package) to obtain a p-value. The p-value represents the probability of observing a Wald Statistic as extreme as the one calculated, assuming the null hypothesis is true. A small p-value (typically less than the chosen significance level, e.g., 0.05) indicates that the null hypothesis can be rejected in favor of the alternative hypothesis.

If the p-value is less than the chosen significance level, it indicates that the coefficient is statistically significant, suggesting that the independent variable significantly impacts the dependent variable. The hypotheses tested are as follows:

H_0: $\beta i = 0$; i = 1, 2, … p

(The independent variable has no effect on the Odds Ratio)

H_1: $\beta i \neq 0$; i = 1, 2, … p

Likelihood Function

The Likelihood Function, which includes the Full model (L_i) and the Simple model (L_0), is employed to test and transform the odds ratio using Log. The likelihood function and likelihood ratio test are employed to evaluate the significance of variables and their odds ratios in logistic regression models. Commonly, the odds ratio is transformed using the logarithm to facilitate the understanding and interpretation of these variables' effects on the outcome in terms of log-odds. This transformation yields the Likelihood-Ratio Test Statistics.

$$-2\log\left(\frac{L_0}{L_1}\right) = -2\left[\log(L_0) - \log(L_1)\right] = -2LL \tag{3-11}$$

Hosmer-Lemeshow Goodness of Fit Test

The Hosmer-Lemeshow Goodness of Fit Test is a statistical test used to assess how well a logistic regression model fits the observed data. It is commonly employed to evaluate the goodness of fit in binary classification models, such as logistic regression models, by comparing the predicted probabilities with the observed outcomes. The Hosmer-Lemeshow test uses a Chi-Square test statistic to compare the observed and expected frequencies in these bins. The Chi-Square statistic measures the difference between the observed and expected values in each bin. The null hypothesis (H_0) in the Hosmer-Lemeshow test is that there is no difference between the observed and expected frequencies, indicating a good fit of the logistic regression model. The alternative hypothesis is that there is a significant difference, suggesting a poor fit. The test calculates the Chi-Square statistic and its associated p-value. In the context of statistical hypothesis testing, if the calculated p-value is below a designated significance level (e.g., 0.05), the null hypothesis is rejected, and the inference drawn is that the model inadequately captures the underlying patterns within the data. This outcome underscores the discordance between the proposed model and the observed dataset, emphasizing the adherence to predetermined significance levels for robust scientific interpretation. If the p-value is significant (i.e., less than the chosen significance level), it suggests that the logistic regression model does not adequately fit the observed data. This could indicate that there are deficiencies in the model's ability to capture the relationship between the predictor variables and the binary outcome. The hypotheses tested are as follows:

H_0: The model is a good fit.

H_1: The model is not a good fit.

If the test statistic is not statistically significant, H_0 is accepted, indicating that the model is a good fit. This acceptance suggests that the logistic regression model fits the observed data well, effectively capturing the relationship between the predictor variables and the binary outcome variable.

Cox & Snell R Square (Rcs^2)

Goodness of fit in logistic regression is a measure of how well the logistic regression model fits the observed data. It assesses whether the model adequately explains the variability in the binary outcome variable. In the context of linear regression, the coefficient of determination (R-squared) is used to quantify the percentage of variance in the dependent variable that is explained by the independent variables. It ranges from 0 to 1, with 1 indicating a perfect fit. Unlike linear regression, logistic regression does not use R-squared to measure the percentage of variance explained, as the logistic model does not directly predict the dependent variable. Instead, logistic regression models are primarily concerned with modeling the probability of a binary outcome. Cox & Snell pseudo R-squared and other similar statistics are used in logistic regression to provide a measure of how well the model fits the data. These pseudo R-squared statistics range from 0 to 1 but are not directly interpreted as the percentage of variance explained. They are a measure of how much better the model fits the data compared to a null model (a model with no predictors). In summary, this test examines the goodness of fit of the model and explains the percentage of variance in logistic regression analysis. Generally, Cox & Snell R Square is less than or equal to 1.

Nagelkerke R Square (R^2_N)

Nagelkerke's R-squared is used to assess the goodness of fit in logistic regression and to provide an estimate of the proportion of variance in the binary outcome variable that is explained by the model's predictors. In general, the value of Nagelkerke R Square is greater than Cox & Snell R Square. Nagelkerke's R-squared, like other pseudo R-squared statistics, is a value that ranges from 0 to 1. An R^2_N value of 0 indicates that the model does not explain any of the variance in the dependent variable, while an R^2_N value of 1 suggests that the model perfectly explains all the variance. However, achieving an R^2_N of 1 is rare in practice.

3.5.2 Qualitative Data Analysis

For a qualitative approach, the content analysis method and the NVivo software program were utilized to analyze the qualitative data gathered through in-depth interviews. Following the completion of the in-depth interviews, a thorough analysis of the collected data was conducted using content analysis. The transcripts were read multiple times to gain a comprehensive understanding of the content. In addition, during this process, key concepts, ideas, and patterns were identified and assigned codes to facilitate organization and categorization. These codes were then grouped together to form overarching themes that represented patterns and concepts emerging from the data. The analysis identified industries and professions likely to be impacted by AI technologies like ChatGPT and Gemini, gathered insights on expected changes, and explored opportunities and challenges these tools present. Moreover, it assessed their potential to disrupt job roles and industry practices, and examined the broader effects on career development, including changes in career paths, skill requirements, and professional growth opportunities in the digital economy. By systematically examining the themes, valuable insights into the similarities, distinctions, and underlying factors shaping these perceptions were obtained.

Content analysis is a qualitative method for comprehensively and objectively explaining and quantifying specific phenomena through the use of valid inferences derived from verbal, visual, or written data (Luo, 2018). Figure 3.2 portrays a structured outline of the content analysis procedure (Nasir & Avunduk, 2011), a systematic research method employed to evaluate communication within various mediums. It is presented as a descending sequence of steps, each encapsulated within its own segment, resembling an arrow that guides the researcher through the methodology. The first step is the selection of the text to be examined, which is crucial for setting the scope of the analysis. This is followed by specifying the unit of analysis, which could range from single words to entire texts, depending on the research objectives. The third step involves determining the category scheme, which is the foundation for coding and organizing the data. After establishing preliminary categories, the fourth step requires refining these to ensure they align with the research goals, resulting in the selection of final categories. Lastly, the fifth is the analysis and interpretation of findings, where the data is synthesized to derive meaningful insights that address the research questions.

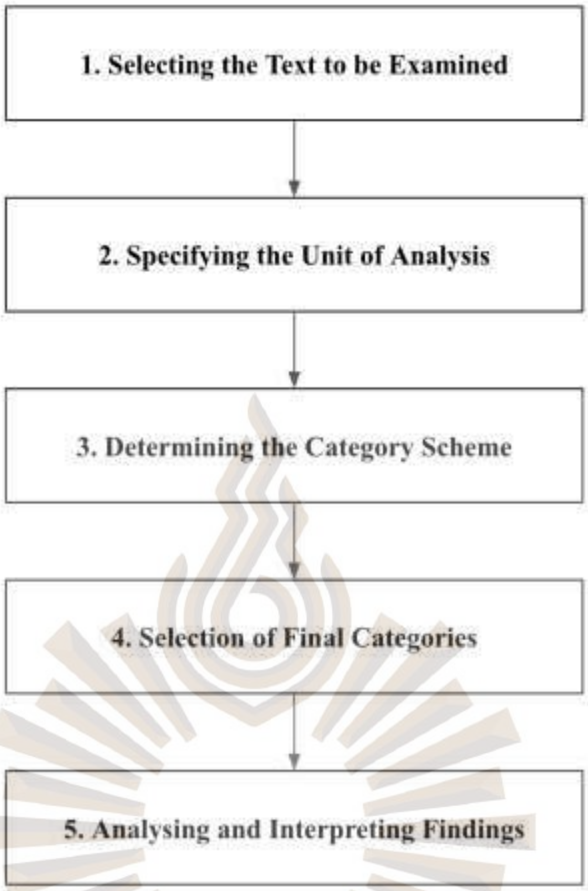

Figure 3.2 Processes of Content Analysis

Source: Nasir & Avunduk, 2011

Each step is essential for conducting a thorough content analysis, providing a structured approach to understanding and interpreting the communication within texts. Content analysis methods can be applied to various forms of content, including written materials, speeches, images, and multimedia (Luo, 2018; Nasir & Avunduk, 2011).

NVivo is an essential tool in qualitative research, providing researchers with the capability to handle, analyze, and interpret extensive amounts of unstructured data efficiently. Its wide range of features includes importing data, coding, multimedia analysis, and facilitating teamwork, rendering it invaluable in diverse research fields. NVivo's structured approach to qualitative data analysis allows researchers to uncover significant insights and develop knowledge that furthers various disciplines and supports informed decision-making. NVivo is instrumental in advancing research and promoting evidence-based conclusions (Hilal & Alabri, 2013).

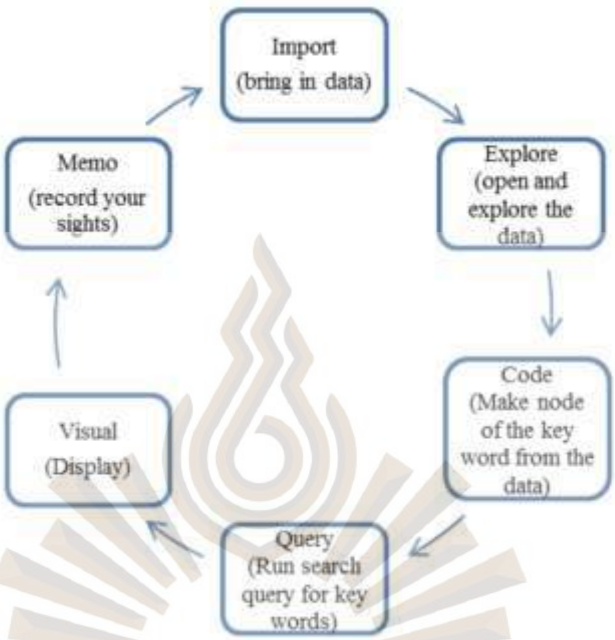

Figure 3.3 A Step by Step Process of NVivo Qualitative Analysis

Source: Dollah et al., 2017

According to Dollah, Abduh, and Rosmaladewi (2017), the data analysis process using NVivo, as depicted in Figure 3.3, follows a cyclic methodology that initiates with the importation of various data formats, including interview transcripts, videos, and images. Subsequent to data importation, an exploratory phase identifies key words emerging from the participant responses or document contents. These keywords are then systematically coded using the node feature in NVivo. A query function is employed to search and retrieve these coded key words, facilitating a comprehensive display of all pertinent data points. Visualization techniques, such as word cloud, word tree, and tree map, are utilized to represent the key words effectively. Concurrently, the researcher has the opportunity to record additional comments or significant insights through the memo function, enriching the analytical process.

The integration of content analysis and NVivo software facilitated a comprehensive examination of the data, leading to deeper insights into the experiences and perceptions of participants. This approach enhanced the understanding of the influence of ChatGPT and Gemini on career development prospects within the digital economy. By systematically coding and categorizing the qualitative data, significant themes and patterns were identified, providing a nuanced understanding of how these AI technologies impact professional roles, skill requirements, and opportunities for growth. This methodological combination ensured a robust analysis, allowing for a detailed exploration of the complexities surrounding the adoption and integration of AI.

Chapter 4

Results

This section delineates the findings derived from the analysis of the collected data, systematically addressing the research objectives and questions previously outlined in the introduction section. The presentation of results commences with an overview of the general characteristics of the survey respondents, providing a foundational context for the ensuing analyses. This is followed by an in-depth examination of the factors influencing the adoption of ChatGPT and Google’s Gemini. The subsequent sections explore the impact of these advanced AI technologies on various industries and professions, elucidating both the opportunities and disruptions they engender. Finally, the analysis delves into the economic impact and implications for career development within the digital economy, offering comprehensive insights into how these technologies are transforming the professional landscape. The structure of this chapter is organized as follows:

4.1 General Characteristics of the Survey Respondents

4.2 Factors Influencing the Adoption of ChatGPT and Gemini

4.3 Opportunities and Disruptions by ChatGPT and Gemini

4.4 Economic Impact and Career Development with ChatGPT and Gemini

4.1 General Characteristics of the Survey Respondents

The survey respondents' general characteristics were thoroughly analyzed through data collected from both online questionnaires and in-depth interviews. This demographic analysis provided a robust framework for interpreting the broader study findings. It encompassed a variety of essential factors such as age, gender, educational background, status, and income, among others. This detailed profiling helps in understanding the diversity and commonalities among the participants, thereby enhancing the relevance and applicability of the conclusions drawn from the research.

This foundational demographic insight ensures that the subsequent findings are viewed through the lens of an accurately represented cross-section of the study population.

4.1.1 General Characteristics of the Respondents from Online Questionnaires

Respondents for the online questionnaires were strategically selected through convenience sampling to ensure representation from a broad demographic spectrum, aligning with the study's objectives. This group encompassed a diverse range of ages, genders, and educational backgrounds, which facilitated the generation of statistically significant conclusions across a comprehensive sample. The use of convenience sampling allowed for the rapid assembly of a structured and uniform dataset, critical for conducting extensive quantitative analyses. Following the collection, a thorough data cleansing process was implemented to ensure accuracy and relevance. This process involved removing incomplete responses, correcting data entry errors, and excluding outliers. Such meticulous data cleansing refines the dataset and enhances the reliability of the study's findings. This approach highlights general trends and patterns within the population, and supports robust data interpretation, vital for understanding broad behavioral and attitudinal dynamics. Table 4.1 provides an overview of the general data characteristics of the respondents from the online questionnaires, post data cleansing, offering an accurate reflection of the dataset utilized for analysis.

Table 4.1 General Data Characteristics of the Respondents from the Online Questionnaires

General Information		Frequency	Percentage
Gender	Female	210	18.1%
	Male	949	81.9%
Age	20 years old or younger	78	6.7%
	21 - 30 years old	175	15.1%
	31 - 40 years old	402	34.7%

Table 4.1 General Data Characteristics of the Respondents from the Online Questionnaires (Cont.)

General Information		Frequency	Percentage
	41 - 50 years old	316	27.3%
	51 years old or over	188	16.2%
Educational Level	Diploma or lower	180	15.5%
	Bachelor's degree	302	26.1%
	Master's degree or higher	677	58.4%
Status	Single	786	67.8%
	Married	370	31.9%
	Divorce	3	0.3%
Monthly Income	15,000 THB or less	125	10.8%
	15,001 - 30,000 THB	217	18.7%
	30,001 - 45,000 THB	234	20.2%
	45,001 or more	583	50.3%
Facebook Usage	Use	1,135	97.9%
	Not Use	24	2.1%
Instagram Usage	Use	923	79.6%
	Not Use	236	20.4%
X Usage	Use	758	65.4%
	Not Use	401	34.6%
TikTok Usage	Use	878	75.8%
	Not Use	281	24.2%
YouTube Usage	Use	1,128	97.3%
	Not Use	31	2.7%
	Total	1,159	100%

Table 4.1 presents a comprehensive overview of the demographic and social media usage characteristics of the respondents from the online questionnaires. The gender distribution reveals a significant disparity, with male respondents constituting 81.9% of the sample, while females make up 18.1%. Age-wise, the majority of

respondents are in the 31-40 years age group (34.7%), followed by those aged 41-50 years (27.3%), indicating a predominance of middle-aged individuals. The educational attainment of the respondents is notably high, with 58.4% holding a Master's degree or higher and 26.1% possessing a Bachelor's degree, reflecting a well-educated cohort. Marital status data shows that 67.8% of the respondents are single, 31.9% are married, and a marginal 0.3% are divorced. Regarding monthly income, 50.3% of respondents earn more than 45,001 THB, while 20.2% have an income range of 30,001-45,000 THB, and smaller proportions earn less. Social media usage data reveals that an overwhelming majority of respondents use Facebook (97.9%) and YouTube (97.3%), indicating these platforms' dominance. Instagram usage is also high at 79.6%, followed by TikTok (75.8%) and X (formerly Twitter) (65.4%). This demographic and behavioral data underscores the respondents' high educational levels and significant social media engagement, providing a robust foundation for analyzing the influence of technology platforms on their professional and personal lives.

4.1.2 General Characteristics of the Respondents from In-Depth Interviews

According to Thailand's national AI strategy and action plan, which identified ten target sectors, the researcher employed purposive sampling to focus on two specific sectors: education, and the creative economy and tourism. The respondents chosen for in-depth interviews were specifically selected based on their detailed knowledge and direct experiences relevant to these sectors. This approach ensures that each participant can offer in-depth insights and contextual understanding critical to qualitative analysis. Characteristics of the respondents are tailored to meet the research's needs for deep, narrative-rich data, prioritizing individuals who demonstrate reflectiveness, articulation, and a readiness to engage in extensive discussions on the subject matter. Table 4.2 presents the respondent's general characteristics from the in-depth interviews.

Table 4.2 General Data Characteristics of the Respondents from the In-Depth Interviews

No.	Gender	Age	Occupation	Date and Time of Interview
1	Male	32	University Lecturer	May 12, 2024 at 09:00 am
2	Male	30	University Lecturer	May 12, 2024 at 10:00 am
3	Male	49	Ph.D. Researcher	May 14, 2024 at 09:00 am
4	Male	48	School Administrator	May 14, 2024 at 10:00 am
5	Male	34	School Administrator	May 15, 2024 at 10:00 am
6	Female	39	School Administrator	May 15, 2024 at 11:00 am
7	Female	44	University Lecturer	May 15, 2024 at 01:00 pm
8	Female	42	Ph.D. Researcher	May 18, 2024 at 09:00 am
9	Female	29	Ph.D. Researcher	May 18, 2024 at 10:00 am
10	Female	43	University Lecturer	May 20, 2024 at 10:00 am
11	Male	46	Tourism Marketing Director	May 20, 2024 at 11:00 am
12	Male	32	Guest Service Supervisor	May 21, 2024 at 09:00 am
13	Male	48	Human Resources Manager	May 21, 2024 at 11:00 am
14	Male	44	Hostel and Bar Manager	May 22, 2024 at 10:00 am
15	Male	29	Digital Content Creator	May 22, 2024 at 11:00 am
16	Female	52	Tourism Company Executive	May 23, 2024 at 09:00 am
17	Female	38	Travel Desk Supervisor	May 23, 2024 at 10:00 am
18	Female	42	Hotel Manager	May 24, 2024 at 10:00 am
19	Female	45	Hotel General Manager	May 24, 2024 at 11:00 am
20	Female	33	Assistant Manager	May 24, 2024 at 01:00 pm

Table 4.2 presents a comprehensive overview of the general data characteristics of respondents who participated in the in-depth interviews. The table includes a diverse group of 20 individuals, categorized by gender, age, occupation, and the scheduled date and time of their respective interviews. The distribution of respondents reflects a balance of genders—10 males and 10 females, with an equitable representation across a variety of roles within the education and creative economy and tourism sectors. The ages of the respondents range from 29 to 52, providing a broad spectrum of life and professional

experiences. In addition, the occupations vary widely across two major sectors: education and the creative economy and tourism. Within the education sector, participants included university lecturers, school administrators, and Ph.D. researchers, reflecting a variety of roles that contribute to the academic and administrative aspects of education. In the creative economy and tourism sector, roles such as tourism marketing director, tourism company executive, guest service supervisor, various management positions within the hospitality industry (e.g., hotel manager, human resources manager, hostel and bar manager), and a digital content creator are represented. This diverse pool of respondents ensures a rich, multifaceted exploration of experiences and insights, scheduled between May 12 and 24, 2024, facilitating a structured data collection process and an in-depth understanding of the sectors under study. This arrangement underscores the study's methodological rigor in capturing a diverse array of insights from professionals deeply embedded in their respective fields.

4.2 Factors Influencing the Adoption of ChatGPT and Gemini

Employing a quantitative approach, this section investigated the factors influencing the adoption of both ChatGPT and Gemini. The study focused on identifying key variables such as demographic characteristics, user awareness, and social media platform usage. By analyzing these factors, the research aimed to provide a comprehensive understanding of the elements that drive or hinder the adoption of these technologies, with particular attention to the most significant predictors.

4.2.1 Factors Influencing ChatGPT Adoption

This section investigated the influences of attitudes towards ChatGPT adoption, the impact of demographic variables and awareness on its adoption, and the role of social media platform usage in this context. It also explored the combined effects of these factors on ChatGPT adoption, with an emphasis on significant variables.

4.2.1.1 Influences of Attitudes Towards ChatGPT Adoption

Table 4.3 Influences of Attitudes Towards the Adoption of ChatGPT

Attitudes Towards the Adoption of ChatGPT	Mean	Std. Deviation
1. ChatGPT enhances my professional skills	3.95	0.776
2. I believe that ChatGPT can help me learn new things.	4.09	0.800
3. Using ChatGPT helps improve efficiency in my career.	3.99	0.777
4. Using ChatGPT helps boost motivation in my career.	3.98	0.752
5. It is easy to use ChatGPT in my career.	3.99	0.818
6. ChatGPT effectively meets the demands and objectives of my career, significantly improving my work.	4.02	0.837
7. ChatGPT makes me more capable and improves my work.	3.93	0.817
8. ChatGPT can provide me with good opportunities.	4.04	0.855
9. I believe that ChatGPT does not pose a threat to my career.	3.80	0.930
10. I believe that ChatGPT cannot replace my career.	3.95	0.839
11. I enjoy using ChatGPT in my career.	3.91	0.806
12. My opinion about ChatGPT is positive.	4.04	0.799
13. I am satisfied with ChatGPT in my career.	3.98	0.765
14. I will continue to use ChatGPT in the future.	4.05	0.818
15. I will recommend ChatGPT to others.	4.01	0.818

Table 4.3 presents a comprehensive overview of attitudes towards the adoption of ChatGPT, utilizing a Likert-scale survey approach. The data reveals consistently positive perceptions across various aspects of ChatGPT's utility and impact. Respondents strongly believe in ChatGPT's capacity to facilitate learning (M = 4.09, SD = 0.800) and its potential to provide good opportunities (M = 4.04, SD = 0.855). There is also a strong intention to continue using ChatGPT in the future (M = 4.05, SD = 0.818) and to recommend it to others (M = 4.01, SD = 0.818). Notably, while respondents generally believe that ChatGPT does not pose a threat to their careers (M = 3.80, SD = 0.930), this item shows the lowest mean score and highest standard deviation,

suggesting some variability in this perception. The data indicates that users find ChatGPT easy to use (M = 3.99, SD = 0.818) and believe it enhances their professional skills (M = 3.95, SD = 0.776). The consistently high mean scores (all above 3.80) and relatively low standard deviations suggest a generally positive and cohesive attitude towards ChatGPT adoption across various professional and personal dimensions. Overall, the data from Table 4.3 suggest that ChatGPT is perceived as a valuable asset in enhancing professional development and career progression.

4.2.1.2 Influence of Demographics and Awareness on ChatGPT Adoption

Table 4.4 Omnibus Test of the Model's Performance (Demographics and Awareness on ChatGPT Adoption)

		Chi-square	df	Sig.
Step 1	Step	454.487	6	0.000
	Block	454.487	6	0.000
	Model	454.487	6	0.000

Table 4.4 presents the Omnibus Test of Model Coefficients for a logistic regression analysis examining the influence of demographics and awareness on ChatGPT adoption. This test is fundamental in assessing the overall statistical significance of the logistic regression model. The results demonstrate a highly significant model fit (X^2 = 454.487, df = 6, $p < 0.001$). This chi-square statistic represents the difference between the null model (a model with only the intercept) and the full model containing all predictor variables. Moreover, the large chi-square value, coupled with the small p-value ($p < 0.001$), provides strong evidence against the null hypothesis that none of the independent variables are linearly related to the log-odds of the outcome. In other words, this test confirms that the model with the predictors offers a significantly better fit to the data compared to a model without any predictors. Additionally, the consistency of the chi-square values across the Step, Block, and Model rows indicates that all variables were entered in a single block, which is typical for a standard logistic regression analysis. These results suggest that the combination of

demographic factors and awareness measures collectively have a statistically significant impact on ChatGPT adoption, warranting further examination of individual predictor effects in subsequent analyses.

Table 4.5 The Model Summary (Demographics and Awareness on ChatGPT Adoption)

Step	-2 log likelihood	Cox & Snell R square	Nagelkerke R square
1	1146.279[a]	0.324	0.433

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Table 4.5 presents the Model Summary for the logistic regression analysis examining the influence of demographics and awareness on ChatGPT adoption. The -2 Log likelihood value of 1146.279 indicates the model's deviance, with lower values suggesting a better fit, though this alone is not easily interpretable without a baseline comparison. The pseudo R-square values quantify the proportion of variance explained by the model: the Cox & Snell R Square value of 0.324 suggests that approximately 32.4% of the variation in the outcome is explained by the predictors. Given its limitation of not reaching a maximum value of 1, the Nagelkerke R Square is also considered, with a value of 0.433 indicating that the model explains about 43.3% of the variance in ChatGPT adoption. This is a moderate to strong effect size in social science research. Overall, these results suggest that these factors included in the model account for a substantial portion of the variability in ChatGPT adoption.

Table 4.6 Classification Table for Back-Testing (Demographics and Awareness on ChatGPT Adoption)

Observed			Predicted		
			ChatGPT Adoption		Percentage correct
			No	Yes	
Step 1	ChatGPT Adoption	No	495	126	79.7%
		Yes	74	464	86.2%
	Overall percentage				82.7%

Note The cut-off value is .500.

Table 4.6 presents the Classification Table for the logistic regression model predicting ChatGPT adoption based on demographic factors and awareness. This table provides a critical assessment of the model's predictive accuracy by comparing predicted outcomes to observed outcomes. The model employs a cut-off value of 0.500, which is the standard threshold for binary classification in logistic regression. The results indicate a strong overall predictive performance, with the model correctly classifying 82.7% of all cases.

Table 4.7 Variables in the Model (Demographics and Awareness on ChatGPT Adoption)

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Score	-0.556	0.080	47.927	1	0.000	0.573
	Gender	1.488	0.275	29.263	1	0.000	4.430
	Age	-0.886	0.093	90.440	1	0.000	0.412
	Education	0.196	0.150	1.695	1	0.193	1.216
	Status	-1.399	0.228	37.736	1	0.000	0.247
	Income	0.133	0.093	2.022	1	0.155	1.142
	Constance	5.346	0.777	47.385	1	0.000	209.783

a. Variable(s) entered in step 1: Score, gender, age, education, status, income

The predictive regression equation of Model 1 using the coefficients from Table 4.7 can be described by the following equation:

$$P = \frac{1}{1 + e^{-z}}$$

where P is an individual's intent to adopt ChatGPT in Thailand,

Z = 5.346 – 0.556(score) + 1.488(gender) – 0.886(age) – 1.399(status).

Table 4.7 presents the Variables in the Model for the logistic regression analysis examining the influence of demographics and awareness on ChatGPT adoption. This table provides crucial information about the individual contributions of each predictor variable, their statistical significance, and their impact on the odds of ChatGPT adoption. The 'Score' variable, representing awareness, shows a significant negative relationship (B = -0.556, $p < 0.001$, Exp(B) = 0.573), suggesting that for each unit increase in score, the odds of adopting ChatGPT decrease by approximately 42.7% (1 - 0.573). Gender emerges as a strong positive predictor (B = 1.488, $p < 0.001$, Exp(B) = 4.430), indicating that one gender category is 4.43 times more likely to adopt ChatGPT than the other. Age demonstrates a significant negative association (B = -0.886, $p < 0.001$, Exp(B) = 0.412), implying that older individuals are less likely to adopt ChatGPT, with each unit increase in age category reducing the odds of adoption by about 58.8%. The 'Status' variable, representing marital status (specifically, being single), shows a significant negative relationship with ChatGPT adoption (B = -1.399, $p < 0.001$, Exp(B) = 0.247), suggesting that being single is associated with lower odds of adopting ChatGPT compared to those who are not single (e.g., married). Specifically, the odds of ChatGPT adoption for single individuals are approximately 75.3% lower than for non-single individuals (1 - 0.247 = 0.753). Interestingly, education level and income do not reach statistical significance in this model ($p > 0.05$), indicating that they may not be strong predictors of ChatGPT adoption when controlling for other factors. These findings highlight the complex interplay of demographic factors and awareness in predicting ChatGPT adoption, with awareness, age, gender, and status emerging as particularly influential factors.

4.2.1.3 Influence of Social Media Platform Usage on ChatGPT Adoption

Table 4.8 Omnibus Test of the Model's Performance (Social Media Platform Usage on ChatGPT Adoption)

		Chi-square	df	Sig.
Step 1	Step	249.979	5	0.000
	Block	249.979	5	0.000
	Model	249.979	5	0.000

Table 4.8 presents the Omnibus Test of Model Coefficients for a logistic regression analysis investigating the influence of social media platform usage on ChatGPT adoption. The results demonstrate a statistically significant model fit (X^2 = 249.979, df = 5, $p < 0.001$). This chi-square statistic represents the improvement in model fit achieved by including the predictor variables (social media platform usage) compared to a null model with no predictors. The highly significant p-value ($p < 0.001$) provides strong evidence against the null hypothesis that the model with predictors is no better than the intercept-only model. The consistency of the chi-square values across Step, Block, and Model rows indicates that all social media platform variables were entered simultaneously in a single block. These results suggest that social media platform usage collectively has a statistically significant impact on ChatGPT adoption. This finding underscores the potential importance of social media engagement in predicting ChatGPT adoption, warranting further examination of the individual effects of specific platforms in subsequent analyses.

Table 4.9 The Model Summary (Social Media Platform Usage on ChatGPT Adoption)

Step	-2 log likelihood	Cox & Snell R square	Nagelkerke R square
1	1350.787[a]	0.194	0.259

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001

Table 4.9 presents the Model Summary for the logistic regression analysis examining the influence of social media platform usage on ChatGPT adoption. The -2 Log likelihood value of 1350.787 represents the unexplained variance in the model, with lower values indicating better fit. The pseudo R-square measures provide insight into the model's explanatory power. The Cox & Snell R Square value of 0.194 suggests that approximately 19.4% of the variation in ChatGPT adoption is explained by the social media platform usage variables. However, as this measure is limited in its maximum value, the Nagelkerke R Square is provided. The Nagelkerke R Square value of 0.259 indicates that the model explains about 25.9% of the variance in ChatGPT adoption.

Table 4.10 Classification Table for Back-Testing (Social Media Platform Usage on ChatGPT Adoption)

Observed			Predicted: ChatGPT Adoption No	Predicted: ChatGPT Adoption Yes	Predicted: Percentage correct
Step 1	ChatGPT Adoption	No	417	204	67.1%
		Yes	140	398	74.0%
	Overall percentage				70.3%

Note The cut-off value is .500.

Table 4.10 presents the Classification Table for the logistic regression model predicting ChatGPT adoption based on social media platform usage. This table assesses the model's predictive accuracy by comparing predicted outcomes to observed outcomes, using a standard cut-off value of 0.500. The model demonstrates a moderate overall predictive performance, correctly classifying 70.3% of all cases.

Table 4.11 Variables in the Model (Social Media Platform Usage on ChatGPT Adoption)

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Facebook	2.017	1.185	2.900	1	0.089	7.518
	Instagram	1.704	0.272	40.910	1	0.000	5.696
	X	0.932	0.142	43.094	1	0.000	2.540
	TikTok	0.890	0.216	16.991	1	0.000	2.436
	YouTube	-3.217	1.094	8.642	1	0.003	0.040
	Constance	-1.793	0.576	9.703	1	0.002	0.166

a. Variable(s) entered in step 1: Facebook, Instagram, X, TikTok, YouTube

The predictive regression equation of Model 2 using the coefficients from Table 4.11 can be described by the following equation:

$$P = \frac{1}{1+e^{-z}}$$

where P is an individual's intent to adopt ChatGPT in Thailand,

Z = – 1.793 + 1.704(Instagram) + 0.93(X) + 0.890(TikTok) – 3.217(YouTube).

Table 4.11 presents the Variables in the Model for the logistic regression analysis examining the influence of social media platform usage on ChatGPT adoption. The results reveal varying effects across different platforms. Instagram emerges as a significant positive predictor (B = 1.704, p < 0.001, Exp(B) = 5.696), indicating that Instagram users are approximately 5.7 times more likely to adopt ChatGPT compared to non-users. X also shows a significant positive association (B = 0.932, p < 0.001, Exp(B) = 2.540), suggesting X users are about 2.5 times more likely to adopt ChatGPT. TikTok demonstrates a similar positive relationship (B = 0.890, p < 0.001, Exp(B) = 2.436). Interestingly, YouTube usage shows a significant negative association (B = -3.217, p = 0.003, Exp(B) = 0.040), implying that YouTube users are less likely to adopt ChatGPT. Facebook usage does not reach statistical significance (p = 0.089). These findings highlight the differential impacts of various social media platforms on

ChatGPT adoption, with Instagram, X, and TikTok usage positively associated with adoption, while YouTube usage shows a negative association.

4.2.1.4 Influences of Demographic, Awareness, and Social Media Platform Usage Factors on ChatGPT Adoption, Using Only Significant Variables

Table 4.12 Omnibus Test of the Model's Performance (Demographic, Awareness, and Social Media Platform Usage Factors on ChatGPT Adoption, Using Only Significant Variables)

		Chi-square	df	Sig.
Step 1	Step	576.129	8	0.000
	Block	576.129	8	0.000
	Model	576.129	8	0.000

Table 4.12 presents the Omnibus Test of Model Coefficients for a logistic regression analysis investigating the combined influence of demographics, awareness, and social media platform usage on ChatGPT adoption. The results demonstrate a highly significant model fit ($X^2 = 576.129$, df = 8, $p < 0.001$). This substantial chi-square value represents a significant improvement in model fit achieved by including the predictor variables compared to a null model. The highly significant p-value ($p < 0.001$) provides strong evidence against the null hypothesis, indicating that the model with predictors is significantly better than the intercept-only model. The consistency of the chi-square values across Step, Block, and Model rows suggests that all variables were entered simultaneously in a single block. Notably, the chi-square value (576.129) is considerably larger than those observed in the previous models examining demographics and social media usage separately, indicating that this combined model offers a more comprehensive explanation of ChatGPT adoption.

Table 4.13 The Model Summary (Demographic, Awareness, and Social Media Platform Usage Factors on ChatGPT Adoption, Using Only Significant Variables)

Step	-2 log likelihood	Cox & Snell R square	Nagelkerke R square
1	1024.637[a]	0.392	0.523

a. Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.

Table 4.13 presents the Model Summary for the logistic regression analysis examining the combined influence of demographics, awareness, and social media platform usage on ChatGPT adoption. The -2 Log likelihood value of 1024.637 indicates the unexplained variance in the model, with this lower value suggesting a better fit compared to previous models. The pseudo R-square measures provide insight into the model's explanatory power. The Cox & Snell R Square value of 0.392 suggests that approximately 39.2% of the variation in ChatGPT adoption is explained by the included variables. The Nagelkerke R Square, which can reach a maximum of 1, indicates that the model explains about 52.3% of the variance in ChatGPT adoption. This represents a substantial improvement over the previous models that considered demographics and social media usage separately. The higher Nagelkerke R Square value suggests that this combined model offers a more comprehensive explanation of the factors influencing ChatGPT adoption.

Table 4.14 Classification Table for Back-Testing (Demographic, Awareness, and Social Media Platform Usage Factors on ChatGPT Adoption, Using Only Significant Variables)

Observed			Predicted: ChatGPT Adoption No	Predicted: ChatGPT Adoption Yes	Predicted: Percentage correct
Step 1	ChatGPT Adoption	No	507	114	81.6%
		Yes	57	481	89.4%
	Overall percentage				85.2%

<u>Note</u> The cut-off value is .500.

Table 4.14 presents the Classification Table for the logistic regression model predicting ChatGPT adoption based on the combined influence of demographics, awareness, and social media platform usage. This table assesses the model's predictive accuracy using a standard cut-off value of 0.500. The model demonstrates a high overall predictive performance, correctly classifying 85.2% of all cases. The model's performance is notably superior to the previous models that considered demographics and social media usage separately, indicating that the combination of these factors provides a more comprehensive and accurate prediction of ChatGPT adoption.

Table 4.15 Variables in the Model (Demographic, Awareness, and Social Media Platform Usage Factors on ChatGPT Adoption, Using Only Significant Variables)

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Score	-0.374	0.077	23.709	1	0.000	0.688
	Gender	1.446	0.255	32.251	1	0.000	4.248
	Age	-1.013	0.091	123.465	1	0.000	0.363
	Status	-0.529	0.230	5.314	1	0.021	0.589
	Instagram	1.142	0.308	13.771	1	0.000	3.132
	X	0.582	0.198	8.660	1	0.003	1.789
	TikTok	1.708	0.255	45.011	1	0.000	5.519
	YouTube	-1.055	0.449	5.516	1	0.019	0.348
	Constance	2.533	0.925	7.504	1	0.006	12.593

a. Variable(s) entered in step 1: Score, gender, age, status, Instagram, X, TikTok, YouTube

The predictive regression equation of Model 3 using the coefficients from Table 4.15 can be described by the following equation:

$$P = \frac{1}{1+e^{-z}}$$

where P is an individual's intent to adopt ChatGPT in Thailand,

Z = 2.533 – 0.374(score) + 1.446(gender) – 1.013(age) – 0.529(status) + 1.142(Instagram) + 0.582(X) + 1.708(TikTok) – 1.055(YouTube).

Table 4.15 presents the Variables in the Model for the logistic regression analysis examining the combined influence of demographics, awareness, and social media platform usage on ChatGPT adoption. The 'Score' variable, representing awareness, shows a significant negative relationship (B = -0.374, $p < 0.001$, Exp(B) = 0.688), indicating that higher scores are associated with lower odds of adoption. Gender emerges as a strong positive predictor (B = 1.446, $p < 0.001$, Exp(B) = 4.248), suggesting one gender category is 4.25 times more likely to adopt ChatGPT. Age demonstrates a significant negative association (B = -1.013, $p < 0.001$, Exp(B) = 0.363), implying decreased likelihood of adoption with increasing age. Status (being single) shows a negative relationship (B = -0.529, $p = 0.021$, Exp(B) = 0.589). Among social media platforms, Instagram (B = 1.142, $p < 0.001$, Exp(B) = 3.132), X (B = 0.582, $p = 0.003$, Exp(B) = 1.789), and TikTok (B = 1.708, $p < 0.001$, Exp(B) = 5.519) all show significant positive associations with ChatGPT adoption. Interestingly, YouTube usage maintains a negative relationship (B = -1.055, $p = 0.019$, Exp(B) = 0.348). These findings highlight the complex interplay of demographic factors, awareness, and social media usage in predicting ChatGPT adoption, with awareness, age, gender, status, and certain social media platforms, like Instagram, X, TikTok, and YouTube, emerging as particularly influential factors.

4.2.2 Factors Influencing Gemini Adoption

This section investigated the influences of attitudes towards Gemini adoption, the impact of demographic variables and awareness on its adoption, and the role of social media platform usage in this context. Additionally, it explored the combined effects of these factors on Gemini adoption, with an emphasis on significant variables.

4.2.2.1 Influences of Attitudes Towards Gemini Adoption

Table 4.16 Influences of Attitudes Towards the Adoption of Gemini

Attitudes Towards the Adoption of Gemini	Mean	Std. Deviation
1. Gemini enhances my professional skills	3.88	0.773
2. I believe that Gemini can help me learn new things.	3.89	0.805
3. Using Gemini helps improve efficiency in my career.	3.86	0.785
4. Using Gemini helps boost motivation in my career.	3.82	0.803
5. It is easy to use Gemini in my career.	3.82	0.815
6. Gemini effectively meets the demands and objectives of my career, significantly improving my work.	3.88	0.818
7. Gemini makes me more capable and improves my work.	3.86	0.844
8. Gemini can provide me with good opportunities.	3.81	0.822
9. I believe that Gemini does not pose a threat to my career.	3.83	0.854
10. I believe that Gemini cannot replace my career.	3.83	0.851
11. I enjoy using Gemini in my career.	3.78	0.848
12. My opinion about Gemini is positive.	3.85	0.824
13. I am satisfied with Gemini in my career.	3.82	0.819
14. I will continue to use Gemini in the future.	3.88	0.786
15. I will recommend Gemini to others.	3.90	0.808

Table 4.16 presents a comprehensive overview of the respondent's attitudes towards the adoption of Gemini, an AI language model. The table comprises 15 attitudinal statements, each rated on a scale, with means ranging from 3.78 to 3.90 and standard deviations between 0.773 and 0.854. These consistently high mean scores (all above 3.5 on a 5-point scale) suggest generally positive attitudes towards Gemini across various dimensions. Respondents express strong agreement with statements regarding Gemini's potential to enhance professional skills (M = 3.88, SD = 0.773), facilitate learning (M = 3.89, SD = 0.805), and improve career efficiency (M = 3.86, SD = 0.785). Notably, there is also strong intention to recommend Gemini to others (M = 3.90, SD =

0.808) and continue its use in the future (M = 3.88, SD = 0.786). In addition, the relatively low standard deviations indicate consistency in these positive attitudes across respondents. Interestingly, respondents also express confidence that Gemini does not pose a threat to their careers (M = 3.83, SD = 0.854) and cannot replace their roles (M = 3.83, SD = 0.851), suggesting a perception of AI as a complementary tool rather than a substitute for human skills. Overall, these results indicate a favorable disposition towards Google's Gemini, with users perceiving it as a valuable tool for professional development and task execution.

4.2.2.2 Influence of Demographics and Awareness on Gemini Adoption

Table 4.17 Omnibus Test of the Model's Performance (Demographics and Awareness on Gemini Adoption)

		Chi-square	df	Sig.
Step 1	Step	343.571	6	0.000
	Block	343.571	6	0.000
	Model	343.571	6	0.000

Table 4.17 presents the Omnibus Test of Model Coefficients for a logistic regression analysis investigating the influence of demographics and awareness on Gemini adoption. The results demonstrate a statistically significant model fit (X^2 = 343.571, df = 6, $p < 0.001$). This substantial chi-square value represents a significant improvement in model fit achieved by including the predictor variables (demographics and awareness) compared to a null model with no predictors. Furthermore, the highly significant p-value ($p < 0.001$) provides strong evidence against the null hypothesis, indicating that the model with predictors is significantly better than the intercept-only model. The consistency of the chi-square values across Step, Block, and Model rows suggests that all variables were entered simultaneously in a single block. These results underscore the collective importance of demographic factors and awareness in predicting Gemini adoption. The significant model fit indicates that these

variables, when considered together, have a meaningful impact on the likelihood of Gemini adoption.

Table 4.18 The Model Summary (Demographics and Awareness on Gemini Adoption)

Step	-2 log likelihood	Cox & Snell R square	Nagelkerke R square
1	1254.677[a]	0.257	0.343

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Table 4.18 presents the Model Summary for the logistic regression analysis examining the influence of demographics and awareness on the adoption of Google's Gemini. The -2 Log likelihood value of 1254.677 represents the unexplained variance in the model, with lower values indicating better fit. The pseudo R-square measures provide insight into the model's explanatory power. The Cox & Snell R Square value of 0.257 suggests that approximately 25.7% of the variation in Gemini adoption is explained by the demographic and awareness variables. However, as this measure is limited in its maximum value, the Nagelkerke R Square is also provided. The Nagelkerke R Square value of 0.343 indicates that the model explains about 34.3% of the variance in Gemini adoption.

Table 4.19 Classification Table for Back-Testing (Demographics and Awareness on Gemini Adoption)

Observed			Predicted		
			Gemini Adoption		Percentage correct
			No	Yes	
Step 1	Gemini Adoption	No	478	151	76.0%
		Yes	215	315	59.4%
	Overall percentage				68.4%

Note The cut-off value is .500.

Table 4.19 presents the Classification Table for the logistic regression model predicting the adoption of Google' Gemini based on demographic and awareness factors. This table assesses the model's predictive accuracy using a standard cut-off value of 0.500. The model demonstrates a moderate overall predictive performance, correctly classifying 68.4% of all cases.

Table 4.20 Variables in the Model (Demographics and Awareness on Gemini Adoption)

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Score	-0.404	0.074	29.639	1	0.000	0.668
	Gender	0.611	0.271	5.109	1	0.024	1.843
	Age	-1.232	0.104	141.683	1	0.000	0.292
	Education	0.800	0.139	33.044	1	0.000	2.227
	Status	0.331	0.208	2.544	1	0.111	1.393
	Income	0.053	0.093	0.331	1	0.565	1.055
	Constance	4.178	0.719	33.716	1	0.000	65.220

a. Variable(s) entered in step 1: Score, gender, age, education, status, income

The predictive regression equation of Model 4 using the coefficients from Table 4.20 can be described by the following equation:

$$P = \frac{1}{1+e^{-z}}$$

where P is an individual's intent to adopt Gemini in Thailand,

Z = 4.178 – 0.404(score) + 0.611(gender) – 1.232(age) + 0.800(education).

Table 4.20 presents the Variables in the Model for the logistic regression analysis examining the influence of demographics and awareness on Gemini adoption. The 'Score' variable, representing awareness, shows a significant negative relationship (B = -0.404, $p < 0.001$, Exp(B) = 0.668), indicating that higher scores are associated with lower odds of adoption. Gender emerges as a positive predictor (B = 0.611, p = 0.024, Exp(B) = 1.843), suggesting one gender category is 1.84 times more likely to adopt Gemini. Age demonstrates a strong negative association (B = -1.232, $p < 0.001$, Exp(B) = 0.292), implying a substantial decrease in adoption likelihood with increasing age. Education level shows a significant positive relationship (B = 0.800, $p < 0.001$, Exp(B) = 2.227), indicating higher education is associated with increased odds of adoption. Notably, status and income do not reach statistical significance ($p > 0.05$). These findings highlight the complex interplay of demographic factors and awareness in predicting Gemini adoption, with awareness, age, education, and gender emerging as particularly influential factors.

4.2.2.3 Influence of Social Media Platform Usage on Gemini Adoption

Table 4.21 Omnibus Test of the Model's Performance (Social Media Platform Usage on Gemini Adoption)

		Chi-square	df	Sig.
Step 1	Step	33.630	5	0.000
	Block	33.630	5	0.000
	Model	33.630	5	0.000

Table 4.21 presents the Omnibus Test of Model Coefficients for a logistic regression analysis investigating the influence of social media platform usage on the adoption of Google’s Gemini. The results demonstrate a statistically significant model fit (X^2 = 33.630, df = 5, $p < 0.001$). This chi-square statistic represents the improvement in model fit achieved by including the predictor variables (social media platform usage) compared to a null model with no predictors. Moreover, the highly significant p-value ($p < 0.001$) provides evidence against the null hypothesis that the model with predictors is no better than the intercept-only model. The consistency of the chi-square values across Step, Block, and Model rows indicates that all social media platform variables were entered simultaneously in a single block.

Table 4.22 The Model Summary (Social Media Platform Usage on Gemini Adoption)

Step	-2 log likelihood	Cox & Snell R square	Nagelkerke R square
1	1564.619[a]	0.029	0.038

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Table 4.22 presents the Model Summary for the logistic regression analysis examining the influence of social media platform usage on the adoption of Gemini. The -2 Log likelihood value of 1564.619 represents the unexplained variance in the model, with lower values indicating better fit. Notably, this value is higher than that observed in the demographic model (Table 4.18), suggesting a poorer fit. The pseudo R-square measures provide insight into the model's explanatory power. The Cox & Snell R Square value of 0.029 suggests that only approximately 2.9% of the variation in Gemini adoption is explained by the social media platform usage variables. The Nagelkerke R Square, which can reach a maximum of 1, indicates that the model explains about 3.8% of the variance in Gemini adoption.

Table 4.23 Classification Table for Back-Testing (Social Media Platform Usage on Gemini Adoption)

Observed			Predicted		
			Gemini Adoption		Percentage correct
			No	Yes	
Step 1	Gemini Adoption	No	360	269	57.2%
		Yes	169	361	68.1%
	Overall percentage				62.2%

Note The cut-off value is .500.

Table 4.23 presents the Classification Table for the model predicting Gemini adoption based on social media platform usage. This table assesses the model's predictive accuracy using a standard cut-off value of 0.500. The model demonstrates a modest overall predictive performance, correctly classifying 62.2% of all cases.

Table 4.24 Variables in the Model (Social Media Platform Usage on Gemini Adoption)

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Facebook	1.056	1.137	0.863	1	0.353	2.875
	Instagram	-0.080	0.208	0.149	1	0.699	0.923
	X	0.330	0.129	6.554	1	0.010	1.391
	TikTok	0.514	0.194	6.978	1	0.008	1.671
	YouTube	-2.104	1.086	3.754	1	0.053	0.122
	Constance	0.301	0.463	0.424	1	0.515	1.352

a. Variable(s) entered in step 1: Facebook, Instagram, X, TikTok, YouTube

The predictive regression equation of Model 5 using the coefficients from Table 4.24 can be described by the following equation:

$$P = \frac{1}{1+e^{-z}}$$

where P is an individual's intent to adopt Gemini in Thailand,

Z = 0.301 + 0.330(X) + 0.514(TikTok).

Table 4.24 presents the Variables in the Model for the logistic regression analysis examining the influence of social media platform usage on Gemini adoption. The results reveal varying effects across different platforms, with only two reaching statistical significance. X (formerly Twitter) shows a positive association (B = 0.330, p = 0.010, Exp(B) = 1.391), suggesting that X users are about 1.4 times more likely to adopt Gemini compared to non-users. TikTok demonstrates a stronger positive relationship (B = 0.514, p = 0.008, Exp(B) = 1.671), indicating that TikTok users are approximately 1.7 times more likely to adopt Gemini. Interestingly, Facebook (p = 0.353), Instagram (p = 0.699), and YouTube (p = 0.053) do not reach statistical significance These findings highlight the differential impacts of various social media platforms on Gemini adoption, with X and TikTok usage positively associated with adoption, while other platforms show no significant effect.

4.2.2.4. Influences of Demographic, Awareness, and Social Media Platform Usage Factors on Gemini Adoption, Using Only Significant Variables

Table 4.25 Omnibus Test of the Model's Performance (Demographic, Awareness, and Social Media Platform Usage Factors on Gemini Adoption, Using Only Significant Variables)

		Chi-square	df	Sig.
Step 1	Step	352.920	6	0.000
	Block	352.920	6	0.000
	Model	352.920	6	0.000

Table 4.25 presents the Omnibus Test of Model Coefficients for a logistic regression analysis investigating the combined influence of demographics, awareness, and social media platform usage on Gemini adoption. The results demonstrate a highly significant model fit (X^2= 352.920, df = 6, p < 0.001). This substantial chi-square value represents a significant improvement in model fit achieved by including the predictor variables compared to a null model. The highly significant p-value (p < 0.001) provides strong evidence against the null hypothesis, indicating that the model with predictors is significantly better than the intercept-only model. The consistency of the chi-square values across Step, Block, and Model rows suggests that all variables were entered simultaneously in a single block. Notably, the chi-square value (352.920) is considerably larger than those observed in the previous models examining demographics and social media usage separately for Gemini adoption. This indicates that the combined model offers a more comprehensive explanation of Gemini adoption. These results underscore the importance of considering both individual characteristics and social media behavior in predicting AI technology adoption, suggesting that a multifaceted approach yields a more robust predictive model for Gemini adoption.

Table 4.26 The Model Summary (Demographic, Awareness, and Social Media Platform Usage Factors on Gemini Adoption, Using Only Significant Variables)

Step	-2 log likelihood	Cox & Snell R square	Nagelkerke R square
1	1245.329[a]	0.263	0.351

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Table 4.26 presents the Model Summary for the logistic regression analysis examining the combined influence of demographics, awareness, and social media platform usage on Gemini adoption. The -2 Log likelihood value of 1245.329 indicates the unexplained variance in the model, with this lower value suggesting a better fit compared to previous models for Gemini adoption. The pseudo R-square measures provide insight into the model's explanatory power. The Cox & Snell R Square value of 0.263 suggests that approximately 26.3% of the variation in Gemini adoption is explained by the included variables. The Nagelkerke R Square, which can reach a maximum of 1, indicates that the model explains about 35.1% of the variance in Gemini adoption. This represents a substantial improvement over the previous models that considered demographics and social media usage separately for Gemini. The higher Nagelkerke R Square value suggests that this combined model offers a more comprehensive explanation of the factors influencing Gemini adoption.

Table 4.27 Classification Table for Back-Testing (Demographic, Awareness, and Social Media Platform Usage Factors on Gemini Adoption, Using Only Significant Variables)

Observed			Predicted		
			Gemini Adoption		Percentage correct
			No	Yes	
Step 1	Gemini Adoption	No	464	165	73.8%
		Yes	117	413	77.9%
	Overall percentage				75.7%

Note The cut-off value is .500.

Table 4.27 presents the Classification Table for the logistic regression model predicting Gemini adoption based on the combined influence of demographics, awareness, and social media platform usage. This table assesses the model's predictive accuracy using a standard cut-off value of 0.500. The model demonstrates a good overall predictive performance, correctly classifying 75.7% of all cases. The model's performance is notably superior to the previous models that considered demographics and social media usage separately for Gemini adoption, indicating that the combination of these factors provides a more comprehensive and accurate prediction of Gemini adoption. This improved accuracy underscores the importance of considering multiple dimensions – individual characteristics, awareness, and social media behavior – in understanding and predicting Gemini adoption.

Table 4.28 Variables in the Model (Demographic, Awareness, and Social Media Platform Usage Factors on Gemini Adoption, Using Only Significant Variables)

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Score	-0.325	0.073	19.536	1	0.000	0.723
	Gender	0.699	0.248	7.945	1	0.005	2.012
	Age	-1.134	0.082	192.539	1	0.000	0.322
	Education	0.787	0.124	40.378	1	0.000	2.197
	X	-0.514	0.186	7.682	1	0.006	0.598
	TikTok	0.598	0.179	11.136	1	0.000	1.818
	Constance	3.372	0.724	21.679	1	0.000	29.125

a. Variable(s) entered in step 1: Score, gender, age, education, X, TikTok

The predictive regression equation of Model 6 using the coefficients from Table 4.28 can be described by the following equation:

$$P = \frac{1}{1 + e^{-z}}$$

where P is an individual’s intent to adopt Gemini in Thailand,

$Z = 3.372 - 0.325(\text{score}) + 0.699(\text{gender}) - 1.134(\text{age}) + 0.787(\text{education}) - 0.514(X) + 0.598(\text{TikTok})$.

Table 4.28 presents the Variables in the Model for the logistic regression analysis examining the combined influence of demographics, awareness, and social media platform usage on the adoption of Google's Gemini. The 'Score' variable, representing awareness, shows a significant negative relationship ($B = -0.325$, $p < 0.001$, $Exp(B) = 0.723$), indicating that higher scores are associated with lower odds of adoption. Gender emerges as a positive predictor ($B = 0.699$, $p = 0.005$, $Exp(B) = 2.012$), suggesting one gender category is about twice as likely to adopt Gemini. Age demonstrates a strong negative association ($B = -1.134$, $p < 0.001$, $Exp(B) = 0.322$), implying decreased likelihood of adoption with increasing age. In addition, education level shows a significant positive relationship ($B = 0.787$, $p < 0.001$, $Exp(B) = 2.197$), indicating higher education is associated with increased odds of adoption. Interestingly, X usage shows a negative association ($B = -0.514$, $p = 0.006$, $Exp(B) = 0.598$), while TikTok usage is positively associated ($B = 0.598$, $p = 0.001$, $Exp(B) = 1.818$) with Gemini adoption. These findings highlight the complex interplay of demographic factors, awareness, and social media usage in predicting Gemini adoption, with awareness, gender, age, education, and certain social media platforms, like X and TikTok, emerging as particularly influential factors.

4.3 Opportunities and Disruptions by ChatGPT and Gemini

Utilizing a quantitative approach, this section examined the potential factors influencing the opportunities and disruptions associated with AI tools, like ChatGPT and Gemini. The study concentrated on identifying key variables, including demographic characteristics, user awareness, and social media platform usage. Through the analysis of these variables, the research sought to offer a comprehensive understanding of the elements that facilitate or impede the opportunities and disruptions of these technologies, with a particular emphasis on the most significant predictors. Furthermore, a qualitative approach was incorporated to explore the nuanced dimensions of the opportunities and disruptions presented by ChatGPT and Gemini, offering detailed insights into user experiences and perceptions.

4.3.1 ChatGPT Opportunities and Disruptions: A Quantitative Analysis

This section examined the impact of demographic variables and awareness on ChatGPT opportunities and disruptions, as well as the role of social media platform usage in this context. Furthermore, it explored the combined effects of these factors on ChatGPT opportunities and disruptions, with a focus on significant variables.

4.3.1.1 Influence of Demographics and Awareness on ChatGPT Opportunities

Table 4.29 Omnibus Test of the Model's Performance (Demographics and Awareness on ChatGPT Opportunities)

		Chi-square	df	Sig.
Step 1	Step	309.890	6	0.000
	Block	309.890	6	0.000
	Model	309.890	6	0.000

Table 4.29 presents the Omnibus Test of Model Coefficients for a logistic regression analysis investigating the influence of demographics and awareness on perceived opportunities associated with ChatGPT. The results demonstrate a statistically significant model fit (X^2= 309.890, df = 6, $p < 0.001$). This substantial chi-square value represents a significant improvement in model fit achieved by including the predictor variables (demographics and awareness) compared to a null model with no predictors. In addition, the highly significant p-value ($p < 0.001$) provides strong evidence against the null hypothesis, indicating that the model with predictors is significantly better than the intercept-only model. The consistency of the chi-square values across Step, Block, and Model rows suggests that all variables were entered simultaneously in a single block. These results underscore the collective importance of demographic factors and

awareness in predicting perceptions of ChatGPT opportunities. The significant model fit indicates that these variables, when considered together, have a meaningful impact on how individuals perceive the potential benefits or opportunities associated with ChatGPT.

Table 4.30 The Model Summary (Demographics and Awareness on ChatGPT Opportunities)

Step	-2 log likelihood	Cox & Snell R square	Nagelkerke R square
1	1296.721[a]	0.235	0.313

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Table 4.30 presents the Model Summary for the logistic regression analysis examining the influence of demographics and awareness on perceived opportunities associated with ChatGPT. The -2 Log likelihood value of 1296.721 represents the unexplained variance in the model, with lower values indicating better fit. The pseudo R-square measures provide insight into the model's explanatory power. The Cox & Snell R Square value of 0.235 suggests that approximately 23.5% of the variation in perceived ChatGPT opportunities is explained by the demographic and awareness variables. The Nagelkerke R Square indicates that the model explains about 31.3% of the variance in perceived opportunities.

Table 4.31 Classification Table for Back-Testing (Demographics and Awareness on ChatGPT Opportunities)

Observed			Predicted		
			ChatGPT Opportunities		Percentage correct
			No	Yes	
Step 1	ChatGPT Opportunities	No	396	178	69.0%
		Yes	127	458	78.3%
	Overall percentage				73.7%

Note The cut-off value is .500.

Table 4.31 presents the Classification Table for the logistic regression model predicting perceived opportunities associated with ChatGPT based on demographics and awareness. This table assesses the model's predictive accuracy using a standard cut-off value of 0.500. The model demonstrates a good overall predictive performance, correctly classifying 73.7% of all cases.

Table 4.32 Variables in the Model (Demographics and Awareness on ChatGPT Opportunities)

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Score	-0.736	0.079	86.684	1	0.000	0.479
	Gender	-1.520	0.254	35.687	1	0.000	0.219
	Age	-0.194	0.078	6.161	1	0.013	0.824
	Education	0.936	0.150	38.758	1	0.000	2.550
	Status	-1.569	0.192	66.862	1	0.000	0.208
	Income	-0.178	0.083	4.649	1	0.031	0.837
	Constance	7.681	0.778	97.426	1	0.000	2166.754

a. Variable(s) entered in step 1: Score, gender, age, education, status, income

The predictive regression equation of Model 7 using the coefficients from Table 4.32 can be described by the following equation:

$$P = \frac{1}{1+e^{-z}}$$

where P is opportunities by ChatGPT in Thailand,

Z = 7.681 – 0.736(score) – 1.520(gender) – 0.194(age) + 0.936(education) – 1.569(status) – 0.178(income).

Table 4.32 presents the Variables in the Model for the logistic regression analysis examining the influence of demographics and awareness on perceived opportunities associated with ChatGPT. All variables in the model show statistical significance ($p < 0.05$). The 'Score' variable, representing awareness, shows a significant negative relationship (B = -0.736, $p < 0.001$, Exp(B) = 0.479), indicating that higher scores are associated with lower odds of perceiving opportunities. Gender emerges as a strong negative predictor (B = -1.520, $p < 0.001$, Exp(B) = 0.219), suggesting one gender category is less likely to perceive opportunities. Age demonstrates a negative association (B = -0.194, p = 0.013, Exp(B) = 0.824), implying a decrease in perceived opportunities with increasing age. Education level shows a significant positive relationship (B = 0.936, $p < 0.001$, Exp(B) = 2.550), indicating higher education is associated with increased odds of perceiving opportunities. Status (B = -1.569, $p < 0.001$, Exp(B) = 0.208) and income (B = -0.178, p = 0.031, Exp(B) = 0.837) both show negative associations. These findings highlight the complex interplay of demographic factors and awareness in predicting perceptions of ChatGPT opportunities, with education emerging as a particularly strong positive predictor, while other factors show varying degrees of negative association. This suggests that perceptions of AI opportunities are shaped by a nuanced combination of individual characteristics and awareness levels.

4.3.1.2 Influence of Social Media Platform Usage on ChatGPT Opportunities

Table 4.33 Omnibus Test of the Model's Performance (Social Media Platform Usage on ChatGPT Opportunities)

		Chi-square	df	Sig.
Step 1	Step	280.628	5	0.000
	Block	280.628	5	0.000
	Model	280.628	5	0.000

Table 4.33 presents the Omnibus Test of Model Coefficients for a logistic regression analysis investigating the influence of social media platform usage on perceived opportunities associated with ChatGPT. The results demonstrate a statistically significant model fit (X^2 = 280.628, df = 5, $p < 0.001$). This substantial chi-square value represents a significant improvement in model fit achieved by including the predictor

variables (social media platform usage) compared to a null model with no predictors. The highly significant p-value ($p < 0.001$) provides strong evidence against the null hypothesis, indicating that the model with predictors is significantly better than the intercept-only model. The consistency of the chi-square values across Step, Block, and Model rows suggests that all social media platform variables were entered simultaneously in a single block. These results underscore the collective importance of social media usage patterns in predicting perceptions of ChatGPT opportunities. The significant model fit indicates that social media engagement, when considered holistically, has a meaningful impact on how individuals perceive the potential benefits or opportunities associated with ChatGPT.

Table 4.34 The Model Summary (Social Media Platform Usage on ChatGPT Opportunities)

Step	-2 log likelihood	Cox & Snell R square	Nagelkerke R square
1	1325.982[a]	0.215	0.287

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Table 4.34 presents the Model Summary for the logistic regression analysis examining the influence of social media platform usage on perceived opportunities associated with ChatGPT. The -2 Log likelihood value of 1325.982 represents the unexplained variance in the model, with lower values indicating better fit. The pseudo R-square measures provide insight into the model's explanatory power. The Cox & Snell R Square value of 0.215 suggests that approximately 21.5% of the variation in perceived ChatGPT opportunities is explained by the social media platform usage variables. The Nagelkerke R Square, which can reach a maximum of 1, indicates that the model explains about 28.7% of the variance in perceived opportunities. This suggests that social media usage patterns play a substantial role in explaining how individuals perceive potential opportunities associated with ChatGPT.

Table 4.35 Classification Table for Back-Testing (Social Media Platform Usage on ChatGPT Opportunities)

Observed			Predicted		
			ChatGPT Opportunities		Percentage correct
			No	Yes	
Step 1	ChatGPT Opportunities	No	266	308	46.3%
		Yes	52	533	91.1%
	Overall percentage				68.9%

Note The cut-off value is .500.

Table 4.35 presents the Classification Table for the logistic regression model predicting perceived opportunities associated with ChatGPT based on social media platform usage. This table assesses the model's predictive accuracy using a standard cut-off value of 0.500. The model demonstrates a moderate overall predictive performance, correctly classifying 68.9% of all cases.

Table 4.36 Variables in the Model (Social Media Platform Usage on ChatGPT Opportunities)

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Facebook	-0.782	0.865	0.818	1	0.366	0.475
	Instagram	0.813	0.254	10.238	1	0.000	2.254
	X	0.558	0.142	15.458	1	0.000	1.748
	TikTok	2.068	0.238	75.759	1	0.000	7.909
	YouTube	-0.450	0.728	0.382	1	0.537	0.638
	Constance	-1.479	0.576	6.603	1	0.010	0.228

a. Variable(s) entered in step 1: Facebook, Instagram, X, TikTok, YouTube

The predictive regression equation of Model 8 using the coefficients from Table 4.36 can be described by the following equation:

$$P = \frac{1}{1+e^{-z}}$$

where P is opportunities by ChatGPT in Thailand,

Z = – 1.479 + 0.813(Instagram) + 0.558(X) + 2.068(TikTok).

Table 4.36 presents the Variables in the Model for the logistic regression analysis examining the influence of social media platform usage on perceived opportunities associated with ChatGPT. The results reveal varying effects across different platforms, with three reaching statistical significance. Instagram shows a positive association (B = 0.813, p = 0.001, Exp(B) = 2.254), indicating that Instagram users are about 2.25 times more likely to perceive opportunities with ChatGPT. X (formerly Twitter) also demonstrates a positive relationship (B = 0.558, $p < 0.001$, Exp(B) = 1.748), suggesting X users are 1.75 times more likely to perceive opportunities. TikTok emerges as the strongest predictor (B = 2.068, $p < 0.001$, Exp(B) = 7.909), implying that TikTok users are nearly 8 times more likely to perceive opportunities with ChatGPT. Interestingly, Facebook (p = 0.366) and YouTube (p = 0.537) do not reach statistical significance. These findings highlight the differential impacts of various social media platforms on perceptions of ChatGPT opportunities, with Instagram, X, and particularly TikTok usage positively associated with opportunity perception. This underscores the complex relationship between social media engagement and views on AI technology, suggesting that the type of social media platform used may significantly influence how individuals perceive the potential benefits of AI tools like ChatGPT.

4.3.1.3 Influences of Demographic, Awareness, and Social Media Platform Usage Factors on ChatGPT Opportunities, Using Only Significant Variables

Table 4.37 Omnibus Test of the Model's Performance (Demographic, Awareness, and Social Media Platform Usage Factors on ChatGPT Opportunities, Using Only Significant Variables)

		Chi-square	df	Sig.
Step 1	Step	453.031	9	0.000
	Block	453.031	9	0.000
	Model	453.031	9	0.000

Table 4.37 presents the Omnibus Test of Model Coefficients for a logistic regression analysis investigating the combined influence of demographics, awareness, and social media platform usage on perceived opportunities associated with ChatGPT. The results demonstrate a highly significant model fit ($X^2 = 453.031$, df = 9, $p < 0.001$). This substantial chi-square value represents a significant improvement in model fit achieved by including the predictor variables compared to a null model. The highly significant p-value ($p < 0.001$) provides strong evidence against the null hypothesis, indicating that the model with predictors is significantly better than the intercept-only model. The consistency of the chi-square values across Step, Block, and Model rows suggests that all variables were entered simultaneously in a single block. Notably, the chi-square value (453.031) is considerably larger than those observed in the previous models examining demographics and social media usage separately for ChatGPT opportunity perception. This indicates that the combined model offers a more comprehensive explanation of how individuals perceive opportunities associated with ChatGPT. These results underscore the importance of considering both individual characteristics and social media behavior in predicting perceptions of AI technology opportunities, suggesting that a multifaceted approach yields a more robust predictive model for understanding views on ChatGPT's potential benefits.

Table 4.38 The Model Summary (Demographic, Awareness, and Social Media Platform Usage Factors on ChatGPT Opportunities, Using Only Significant Variables)

Step	-2 log likelihood	Cox & Snell R square	Nagelkerke R square
1	1153.580[a]	0.324	0.431

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Table 4.38 presents the Model Summary for the logistic regression analysis examining the combined influence of demographics, awareness, and social media platform usage on perceived opportunities associated with ChatGPT. The -2 Log likelihood value of 1153.580 indicates the unexplained variance in the model, with this lower value suggesting a better fit compared to previous models for ChatGPT opportunity perception. The pseudo R-square measures provide insight into the model's explanatory power. The Cox & Snell R Square value of 0.324 suggests that approximately 32.4% of the variation in perceived ChatGPT opportunities is explained by the included variables. The Nagelkerke R Square, which can reach a maximum of 1, indicates that the model explains about 43.1% of the variance in perceived opportunities. This represents a substantial improvement over the previous models that considered demographics and social media usage separately for ChatGPT opportunity perception. The higher Nagelkerke R Square value suggests that this combined model offers a more comprehensive explanation of the factors influencing how individuals perceive opportunities associated with ChatGPT. These results underscore the value of integrating multiple factors – demographics, awareness, and social media usage – in understanding perceptions of AI technology opportunities, providing a more holistic view of how individuals assess the potential benefits of tools like ChatGPT.

Table 4.39 Classification Table for Back-Testing (Demographic, Awareness, and Social Media Platform Usage Factors on ChatGPT Opportunities, Using Only Significant Variables)

Observed			Predicted		
			ChatGPT Opportunities		Percentage correct
			No	Yes	
Step 1	ChatGPT	No	438	136	76.3%
	Opportunities	Yes	99	486	83.1%
	Overall percentage				79.7%

Note The cut-off value is .500.

Table 4.39 presents the Classification Table for the logistic regression model predicting perceived opportunities associated with ChatGPT based on the combined influence of demographics, awareness, and social media platform usage. This table assesses the model's predictive accuracy using a standard cut-off value of 0.500. The model demonstrates a strong overall predictive performance, correctly classifying 79.7% of all cases. The model's performance is notably superior to the previous models that considered demographics and social media usage separately for ChatGPT opportunity perception, indicating that the combination of these factors provides a more comprehensive and accurate prediction of how individuals perceive opportunities associated with ChatGPT. This improved accuracy underscores the importance of considering multiple dimensions – individual characteristics, awareness, and social media behavior – in understanding perceptions of AI technology opportunities. The high overall accuracy and balanced prediction across outcomes suggest that this integrated approach captures a significant portion of the factors influencing views on ChatGPT's potential benefits.

Table 4.40 Variables in the Model (Demographic, Awareness, and Social Media Platform Usage Factors on ChatGPT Opportunities, Using Only Significant Variables)

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Score	-0.606	0.085	50.576	1	0.000	0.545
	Gender	-2.477	0.315	61.769	1	0.000	0.084
	Age	-0.520	0.093	31.498	1	0.000	0.594
	Education	0.970	0.177	29.989	1	0.000	2.638
	Status	-0.599	0.259	5.367	1	0.021	0.549
	Income	-0.179	0.094	3.617	1	0.057	0.836
	Instagram	-0.493	0.290	2.891	1	0.089	0.611
	X	0.651	0.207	9.907	1	0.002	1.917
	TikTok	2.579	0.301	73.243	1	0.000	13.183
	Constance	5.624	0.926	36.912	1	0.000	277.031

a. Variable(s) entered in step 1: Score, gender, age, education, status, income, Instagram, X, TikTok

The predictive regression equation of Model 9 using the coefficients from Table 4.40 can be described by the following equation:

$$P = \frac{1}{1+e^{-z}}$$

where P is opportunities by ChatGPT in Thailand,

Z = 5.624 – 0.606(score) – 2.477(gender) – 0.520(age) + 0.970(education) – 0.599(status) + 0.651(X) + 2.579(TikTok).

Table 4.40 presents the Variables in the Model for the logistic regression analysis examining the combined influence of demographics, awareness, and social media platform usage on perceived opportunities associated with ChatGPT. The majority of variables in the model show statistical significance ($p < 0.05$). The 'Score' variable, representing awareness, shows a significant negative relationship (B = -0.606, $p < 0.001$, Exp(B) = 0.545), indicating that higher scores are associated with lower odds of perceiving opportunities. Gender emerges as a strong negative predictor (B = -2.477, $p < 0.001$, Exp(B) = 0.084), suggesting one gender category is significantly less likely to perceive opportunities. Age demonstrates a negative association (B = -0.520, $p < 0.001$, Exp(B) = 0.594), implying decreased perception of opportunities with increasing age. Education level shows a significant positive relationship (B = 0.970, $p < 0.001$, Exp(B) = 2.638), indicating higher education is associated with increased odds of perceiving opportunities. Status (B = -0.599, p = 0.021, Exp(B) = 0.549) shows a negative association. Among social media platforms, X (B = 0.651, p = 0.002, Exp(B) = 1.917) and particularly TikTok (B = 2.579, $p < 0.001$, Exp(B) = 13.183) show strong positive associations with perceiving ChatGPT opportunities. These findings highlight the complex interplay of demographic factors, awareness, and social media usage in predicting perceptions of ChatGPT opportunities, with education and certain social media platforms, like X and TikTok, emerging as particularly influential positive factors, while awareness, age, status, and gender show strong negative associations.

4.3.1.4 Influence of Demographics and Awareness on ChatGPT Disruptions

Table 4.41 Omnibus Test of the Model's Performance (Demographics and Awareness on ChatGPT Disruptions)

		Chi-square	df	Sig.
Step 1	Step	596.603	6	0.000
	Block	596.603	6	0.000
	Model	596.603	6	0.000

Table 4.41 presents the Omnibus Test of Model Coefficients for a logistic regression analysis investigating the influence of demographics and awareness on perceived disruptions associated with ChatGPT. The results demonstrate a highly significant model fit ($X^2 = 596.603$, df = 6, $p < 0.001$). This substantial chi-square value

represents a significant improvement in model fit achieved by including the predictor variables (demographics and awareness) compared to a null model with no predictors. The highly significant p-value ($p < 0.001$) provides strong evidence against the null hypothesis, indicating that the model with predictors is significantly better than the intercept-only model. The consistency of the chi-square values across Step, Block, and Model rows suggests that all variables were entered simultaneously in a single block. These results underscore the collective importance of demographic factors and awareness in predicting perceptions of ChatGPT disruptions.

Table 4.42 The Model Summary (Demographics and Awareness on ChatGPT Disruptions)

Step	-2 log likelihood	Cox & Snell R square	Nagelkerke R square
1	994.816[a]	0.402	0.539

a. Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.

Table 4.42 presents the Model Summary for the logistic regression analysis examining the influence of demographics and awareness on perceived disruptions associated with ChatGPT. The -2 Log likelihood value of 994.816 represents the unexplained variance in the model, with lower values indicating better fit. The pseudo R-square measures provide insight into the model's explanatory power. The Cox & Snell R Square value of 0.402 suggests that approximately 40.2% of the variation in perceived ChatGPT disruptions is explained by the demographic and awareness variables. The Nagelkerke R Square, which can reach a maximum of 1, indicates that the model explains about 53.9% of the variance in perceived disruptions. This suggests that demographics and awareness play a significant role in explaining how individuals perceive potential disruptions associated with ChatGPT.

Table 4.43 Classification Table for Back-Testing (Demographics and Awareness on ChatGPT Disruptions)

Observed			Predicted		
			ChatGPT Disruptions		Percentage correct
			No	Yes	
Step 1	ChatGPT Disruptions	No	571	75	88.4%
		Yes	140	373	72.7%
	Overall percentage				81.4%

Note The cut-off value is .500.

Table 4.43 presents the Classification Table for the logistic regression model predicting perceived disruptions associated with ChatGPT based on demographics and awareness. This table assesses the model's predictive accuracy using a standard cut-off value of 0.500. The model demonstrates a strong overall predictive performance, correctly classifying 81.4% of all cases.

Table 4.44 Variables in the Model (Demographics and Awareness on ChatGPT Disruptions)

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Score	-0.564	0.101	31.459	1	0.000	0.569
	Gender	1.381	0.304	20.603	1	0.000	3.980
	Age	-1.763	0.150	138.214	1	0.000	0.172
	Education	0.811	0.158	26.208	1	0.000	2.250
	Status	-1.246	0.268	21.572	1	0.000	0.288
	Income	1.148	0.156	54.470	1	0.000	3.153
	Constance	4.328	0.929	21.720	1	0.000	75.803

a. Variable(s) entered in step 1: Score, gender, age, education, status, income

The predictive regression equation of Model 10 using the coefficients from Table 4.44 can be described by the following equation:

$$P = \frac{1}{1+e^{-z}}$$

where P is disruptions by ChatGPT in Thailand,

Z = 4.328 – 0.564(score) + 1.381(gender) – 1.763(age) + 0.811(education) – 1.246(status) + 1.148(income).

Table 4.44 presents the Variables in the Model for the logistic regression analysis examining the influence of demographics and awareness on perceived disruptions associated with ChatGPT. All variables in the model show statistical significance ($p < 0.001$). The 'Score' variable, representing awareness, shows a negative relationship (B = -0.564, Exp(B) = 0.569), indicating that higher scores are associated with lower odds of perceiving disruptions. Gender emerges as a positive predictor (B = 1.381, Exp(B) = 3.980), suggesting one gender category is nearly 4 times more likely to perceive disruptions. Age demonstrates a strong negative association (B = -1.763, Exp(B) = 0.172), implying a substantial decrease in perceived disruptions with increasing age. Education level shows a positive relationship (B = 0.811, Exp(B) = 2.250), indicating higher education is associated with increased odds of perceiving disruptions. Status (B = -1.246, Exp(B) = 0.288) shows a negative association, while income (B = 1.148, Exp(B) = 3.153) shows a positive association with perceiving disruptions. These findings highlight the complex interplay of demographic factors and awareness in predicting perceptions of ChatGPT disruptions, with gender, education, and income emerging as positive predictors, while awareness, age, and status show negative associations. This suggests that perceptions of AI disruptions are shaped by a nuanced combination of individual characteristics and awareness levels, with some factors increasing the likelihood of perceiving disruptions and others decreasing it.

4.3.1.5 Influence of Social Media Platform Usage on ChatGPT Disruptions

Table 4.45 Omnibus Test of the Model's Performance (Social Media Platform Usage on ChatGPT Disruptions)

		Chi-square	df	Sig.
Step 1	Step	240.155	5	0.000
	Block	240.155	5	0.000
	Model	240.155	5	0.000

Table 4.45 presents the Omnibus Test of Model Coefficients for a logistic regression analysis investigating the influence of social media platform usage on perceived disruptions associated with ChatGPT. The results demonstrate a statistically significant model fit ($X^2 = 240.155$, df = 5, $p < 0.001$). This substantial chi-square value represents a significant improvement in model fit achieved by including the predictor variables (social media platform usage) compared to a null model with no predictors. The highly significant p-value ($p < 0.001$) provides strong evidence against the null hypothesis, indicating that the model with predictors is significantly better than the intercept-only model. The consistency of the chi-square values across Step, Block, and Model rows suggests that all social media platform variables were entered simultaneously in a single block. These results underscore the collective importance of social media usage patterns in predicting perceptions of ChatGPT disruptions. The significant model fit indicates that social media engagement, when considered holistically, has a meaningful impact on how individuals perceive the potential disruptive effects associated with ChatGPT. This finding provides a solid foundation for further examination of the individual effects of specific social media platforms in subsequent analyses of the model, suggesting that social media usage plays a crucial role in shaping perceptions of AI-related disruptions.

Table 4.46 The Model Summary (Social Media Platform Usage on ChatGPT Disruptions)

Step	-2 log likelihood	Cox & Snell R square	Nagelkerke R square
1	1351.264[a]	0.187	0.251

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Table 4.46 presents the Model Summary for the logistic regression analysis examining the influence of social media platform usage on perceived disruptions associated with ChatGPT. The -2 Log likelihood value of 1351.264 represents the unexplained variance in the model, with lower values indicating better fit. The pseudo R-square measures provide insight into the model's explanatory power. The Cox & Snell R Square value of 0.187 suggests that approximately 18.7% of the variation in perceived ChatGPT disruptions is explained by the social media platform usage variables. The Nagelkerke R Square, which can reach a maximum of 1, indicates that the model explains about 25.1% of the variance in perceived disruptions. This suggests that social media usage patterns play a substantial role in explaining how individuals perceive potential disruptions associated with ChatGPT.

Table 4.47 Classification Table for Back-Testing (Social Media Platform Usage on ChatGPT Disruptions)

Observed			Predicted		
			ChatGPT Disruptions		Percentage correct
			No	Yes	
Step 1	ChatGPT Disruptions	No	414	232	64.1%
		Yes	142	371	72.3%
	Overall percentage				67.7%

<u>Note</u> The cut-off value is .500.

Table 4.47 presents the Classification Table for the logistic regression model predicting perceived disruptions associated with ChatGPT based on social media

platform usage. This table assesses the model's predictive accuracy using a standard cut-off value of 0.500. The model demonstrates a moderate overall predictive performance, correctly classifying 67.7% of all cases.

Table 4.48 Variables in the Model (Social Media Platform Usage on ChatGPT Disruptions)

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Facebook	-3.141	0.995	9.958	1	0.002	0.043
	Instagram	0.892	0.271	10.864	1	0.000	2.439
	X	0.615	0.142	18.635	1	0.000	1.850
	TikTok	1.772	0.248	51.100	1	0.000	5.884
	YouTube	-0.486	0.749	0.422	1	0.516	0.615
	Constance	0.727	0.685	1.127	1	0.288	2.070

a. Variable(s) entered in step 1: Facebook, Instagram, X, TikTok, YouTube

The predictive regression equation of Model 11 using the coefficients from Table 4.48 can be described by the following equation:

$$P = \frac{1}{1 + e^{-z}}$$

where P is disruptions by ChatGPT in Thailand,

Z = 0.727 – 3.141(Facebook) + 0.892(Instagram) + 0.615(X) + 1.772(TikTok).

Table 4.48 presents the Variables in the Model for the logistic regression analysis examining the influence of social media platform usage on perceived disruptions associated with ChatGPT. The results reveal varying effects across different platforms, with four reaching statistical significance. Facebook shows a strong negative association (B = -3.141, p = 0.002, Exp(B) = 0.043), indicating that Facebook users are significantly less likely to perceive disruptions. In contrast, Instagram (B = 0.892, p = 0.001, Exp(B) = 2.439), X (B = 0.615, p < 0.001, Exp(B) = 1.850), and TikTok (B =

1.772, $p < 0.001$, Exp(B) = 5.884) all demonstrate positive relationships with perceiving disruptions. Notably, TikTok usage emerges as the strongest predictor, with users being nearly 6 times more likely to perceive disruptions. YouTube usage does not reach statistical significance ($p = 0.516$). The constant term is not significant ($p = 0.288$), suggesting no significant baseline tendency towards perceiving disruptions when all social media usage is zero. These findings highlight the differential impacts of various social media platforms on perceptions of ChatGPT disruptions, with Facebook usage negatively associated with disruption perception, while Instagram, X, and particularly TikTok usage are positively associated. This underscores the complex relationship between social media engagement and views on AI technology, suggesting that the type of social media platform used may significantly influence how individuals perceive the potential disruptive effects of AI tools like ChatGPT.

4.3.1.6 Influences of Demographic, Awareness, and Social Media Platform Usage Factors on ChatGPT Disruptions, Using Only Significant Variables

Table 4.49 Omnibus Test of the Model's Performance (Demographic, Awareness, and Social Media Platform Usage Factors on ChatGPT Disruptions, Using Only Significant Variables)

		Chi-square	df	Sig.
Step 1	Step	819.873	10	0.000
	Block	819.873	10	0.000
	Model	819.873	10	0.000

Table 4.49 presents the Omnibus Test of Model Coefficients for a logistic regression analysis investigating the combined influence of demographics, awareness, and social media platform usage on perceived disruptions associated with ChatGPT. The results demonstrate a highly significant model fit ($X^2 = 819.873$, df = 10, $p < 0.001$). This substantial chi-square value represents a significant improvement in model fit achieved by including the predictor variables compared to a null model. The highly significant p-value ($p < 0.001$) provides strong evidence against the null hypothesis,

indicating that the model with predictors is significantly better than the intercept-only model. The consistency of the chi-square values across Step, Block, and Model rows suggests that all variables were entered simultaneously in a single block. Notably, the chi-square value (819.873) is considerably larger than those observed in the previous models examining demographics and social media usage separately for ChatGPT disruption perception. This indicates that the combined model offers a more comprehensive explanation of how individuals perceive disruptions associated with ChatGPT. These results underscore the importance of considering both individual characteristics and social media behavior in predicting perceptions of AI technology disruptions, suggesting that a multifaceted approach yields a more robust predictive model for understanding views on ChatGPT's potential disruptive effects.

Table 4.50 The Model Summary (Demographic, Awareness, and Social Media Platform Usage Factors on ChatGPT Disruptions, Using Only Significant Variables)

Step	-2 log likelihood	Cox & Snell R square	Nagelkerke R square
1	771.546[a]	0.507	0.679

a. Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.

Table 4.50 presents the Model Summary for the logistic regression analysis examining the combined influence of demographics, awareness, and social media platform usage on perceived disruptions associated with ChatGPT. The -2 Log likelihood value of 771.546 indicates the unexplained variance in the model, with this lower value suggesting a substantially better fit compared to previous models for ChatGPT disruption perception. The pseudo R-square measures provide insight into the model's explanatory power. The Cox & Snell R Square value of 0.507 suggests that approximately 50.7% of the variation in perceived ChatGPT disruptions is explained by the included variables. The Nagelkerke R Square, which can reach a maximum of 1, indicates that the model explains about 67.9% of the variance in perceived disruptions. This represents a substantial improvement over the previous models that considered demographics and social media usage separately for ChatGPT disruption perception. The higher Nagelkerke R Square value suggests that this combined model offers a more comprehensive explanation of the factors influencing how individuals perceive disruptions associated with ChatGPT. These results underscore the value of integrating multiple factors – demographics, awareness, and social media usage – in understanding perceptions of AI technology disruptions, providing a more holistic view of how individuals assess the potential disruptive impacts of tools like ChatGPT.

Table 4.51 Classification Table for Back-Testing (Demographic, Awareness, and Social Media Platform Usage Factors on ChatGPT Disruptions, Using Only Significant Variables)

Observed			Predicted: ChatGPT Disruptions No	Predicted: ChatGPT Disruptions Yes	Percentage correct
Step 1	ChatGPT Disruptions	No	553	93	85.6%
		Yes	56	457	89.1%
	Overall percentage				87.1%

Note The cut-off value is .500.

Table 4.51 presents the Classification Table for the logistic regression model predicting perceived disruptions associated with ChatGPT based on the combined influence of demographics, awareness, and social media platform usage. This table assesses the model's predictive accuracy using a standard cut-off value of 0.500. The model demonstrates a strong overall predictive performance, correctly classifying 87.1% of all cases. The model's performance is notably superior to the previous models that considered demographics and social media usage separately for ChatGPT disruption perception, indicating that the combination of these factors provides a more comprehensive and accurate prediction of how individuals perceive disruptions associated with ChatGPT. This improved accuracy underscores the importance of considering multiple dimensions – individual characteristics, awareness, and social media behavior – in understanding perceptions of AI technology disruptions. The high overall accuracy and balanced prediction across outcomes suggest that this integrated approach captures a significant portion of the factors influencing views on ChatGPT's potential disruptive effects.

Table 4.52 Variables in the Model (Demographic, Awareness, and Social Media Platform Usage Factors on ChatGPT Disruptions, Using Only Significant Variables)

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Score	-0.273	0.113	5.893	1	0.015	0.761
	Gender	0.593	0.346	2.941	1	0.086	1.810
	Age	-2.194	0.166	174.017	1	0.000	0.111
	Education	1.664	0.220	57.227	1	0.000	5.278
	Status	1.669	0.362	21.226	1	0.000	5.305
	Income	1.240	0.170	53.464	1	0.000	3.454
	Facebook	-4.572	0.982	21.702	1	0.000	0.010
	Instagram	2.150	0.358	36.056	1	0.000	8.586
	X	-0.222	0.270	0.678	1	0.410	0.801
	TikTok	2.973	0.355	69.970	1	0.000	19.551
	Constance	1.671	1.306	1.636	1	0.201	5.315

a. Variable(s) entered in step 1: Score, gender, age, education, status, income, Facebook, Instagram, X, TikTok

The predictive regression equation of Model 12 using the coefficients from Table 4.52 can be described by the following equation:

$$P = \frac{1}{1+e^{-z}}$$

where P is disruptions by ChatGPT in Thailand,

Z = 1.671 – 0.273(score) – 2.194(age) + 1.664(education) + 1.669(status) + 1.240(income) – 4.572(Facebook) + 2.150(Instagram) + 2.973(TikTok).

Table 4.52 presents the Variables in the Model for the logistic regression analysis examining the combined influence of demographics, awareness, and social media platform usage on perceived disruptions associated with ChatGPT. Most variables in the model show statistical significance ($p < 0.05$). The 'Score' variable, representing awareness, shows a negative relationship ($B = -0.273$, $p = 0.015$, $Exp(B) = 0.761$), indicating that higher scores are associated with slightly lower odds of perceiving disruptions. Age demonstrates a strong negative association ($B = -2.194$, $p < 0.001$, $Exp(B) = 0.111$), implying a substantial decrease in perceived disruptions with increasing age. Education level ($B = 1.664$, $p < 0.001$, $Exp(B) = 5.278$), status ($B = 1.669$, $p < 0.001$, $Exp(B) = 5.305$), and income ($B = 1.240$, $p < 0.001$, $Exp(B) = 3.454$) all show strong positive relationships with perceiving disruptions. Among social media platforms, Facebook usage shows a strong negative association ($B = -4.572$, $p < 0.001$, $Exp(B) = 0.010$), while Instagram ($B = 2.150$, $p < 0.001$, $Exp(B) = 8.586$) and TikTok ($B = 2.973$, $p < 0.001$, $Exp(B) = 19.551$) show strong positive associations with perceiving ChatGPT disruptions. Notably, X usage is not significant in this model ($p = 0.410$). These findings highlight the complex interplay of demographic factors, awareness, and social media usage in predicting perceptions of ChatGPT disruptions, with awareness, age, education, status, income, and certain social media platforms, like Facebook, Instagram, and TikTok, emerging as particularly influential factors.

4.3.2 Gemini Opportunities and Disruptions: A Quantitative Analysis

This section investigated the impact of demographic variables and awareness on Gemini opportunities and disruptions, as well as the role of social media platform usage in this context. Furthermore, it explored the combined effects of these factors on Gemini opportunities and disruptions, with a focus on significant variables.

4.3.2.1 Influence of Demographics and Awareness on Gemini Opportunities

Table 4.53 Omnibus Test of the Model's Performance (Demographics and Awareness on Gemini Opportunities)

		Chi-square	df	Sig.
Step 1	Step	119.349	6	0.000
	Block	119.349	6	0.000
	Model	119.349	6	0.000

Table 4.53 presents the Omnibus Test of Model Coefficients for a logistic regression analysis investigating the influence of demographics and awareness on perceived opportunities associated with Gemini, another AI language model. The results demonstrate a statistically significant model fit (X^2 = 119.349, df = 6, p < 0.001). This chi-square value represents a significant improvement in model fit achieved by including the predictor variables (demographics and awareness) compared to a null model with no predictors. The highly significant p-value (p < 0.001) provides strong evidence against the null hypothesis, indicating that the model with predictors is significantly better than the intercept-only model. The consistency of the chi-square values across Step, Block, and Model rows suggests that all variables were entered simultaneously in a single block. These results underscore the collective importance of demographic factors and awareness in predicting perceptions of Gemini opportunities. The significant model fit indicates that these variables, when considered together, have a meaningful impact on how individuals perceive the potential benefits or opportunities associated with Gemini.

Table 4.54 The Model Summary (Demographics and Awareness on Gemini Opportunities)

Step	-2 log likelihood	Cox & Snell R square	Nagelkerke R square
1	1475.535[a]	0.098	0.131

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Table 4.54 presents the Model Summary for the logistic regression analysis examining the influence of demographics and awareness on perceived opportunities associated with Gemini. The -2 Log likelihood value of 1475.535 represents the unexplained variance in the model, with lower values indicating better fit. The pseudo R-square measures provide insight into the model's explanatory power. The Cox & Snell R Square value of 0.098 suggests that approximately 9.8% of the variation in perceived Gemini opportunities is explained by the demographic and awareness variables. The Nagelkerke R Square, which can reach a maximum of 1, indicates that the model explains about 13.1% of the variance in perceived opportunities. This suggests that demographics and awareness play a modest role in explaining how individuals perceive potential opportunities associated with Gemini.

Table 4.55 Classification Table for Back-Testing (Demographics and Awareness on Gemini Opportunities)

Observed			Predicted		
			Gemini Opportunities		Percentage correct
			No	Yes	
Step 1	Gemini Opportunities	No	458	180	71.8%
		Yes	277	244	46.8%
	Overall percentage				60.6%

Note The cut-off value is .500.

Table 4.55 presents the Classification Table for the logistic regression model predicting perceived opportunities associated with Gemini based on demographics and awareness. This table assesses the model's predictive accuracy using a standard cut-off value of 0.500. The model demonstrates a moderate overall predictive performance, correctly classifying 60.6% of all cases.

Table 4.56 Variables in the Model (Demographics and Awareness on Gemini Opportunities)

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Score	-0.484	0.068	50.013	1	0.000	0.615
	Gender	-1.225	0.234	27.439	1	0.000	0.294
	Age	-0.194	0.074	6.906	1	0.009	0.823
	Education	0.991	0.137	52.555	1	0.000	2.695
	Status	-0.356	0.168	4.505	1	0.034	0.701
	Income	0.035	0.078	0.205	1	0.650	1.036
	Constance	4.089	0.660	38.430	1	0.000	59.707

a. Variable(s) entered in step 1: Score, gender, age, education, status, income

The predictive regression equation of Model 13 using the coefficients from Table 4.56 can be described by the following equation:

$$P = \frac{1}{1+e^{-z}}$$

where P is opportunities by Gemini in Thailand,

Z = 4.089 – 0.484(score) – 1.225(gender) – 0.194(age) + 0.991(education) – 0.356(status).

Table 4.56 presents the Variables in the Model for the logistic regression analysis examining the influence of demographics and awareness on perceived opportunities associated with Gemini. Several variables in the model show statistical significance ($p < 0.05$). The 'Score' variable, representing awareness, shows a significant negative relationship (B = -0.484, $p < 0.001$, Exp(B) = 0.615), indicating that higher scores are associated with lower odds of perceiving opportunities. Gender emerges as a strong negative predictor (B = -1.225, $p < 0.001$, Exp(B) = 0.294), suggesting one gender category is significantly less likely to perceive opportunities. Age demonstrates a negative association (B = -0.194, p = 0.009, Exp(B) = 0.823), implying a decrease in perceived opportunities with increasing age. Education level shows a strong positive relationship (B = 0.991, p < 0.001, Exp(B) = 2.695), indicating higher education is associated with increased odds of perceiving opportunities. Status (B = -0.356, p = 0.034, Exp(B) = 0.701) shows a negative association. Notably, income does not reach statistical significance (p = 0.650). These findings highlight the complex interplay of demographic factors and awareness in predicting perceptions of Gemini opportunities, with education emerging as a particularly strong positive predictor, while awareness, gender, age, and status show negative associations. This suggests that perceptions of AI opportunities related to Gemini are shaped by a nuanced combination of individual characteristics and awareness levels, with some factors increasing the likelihood of perceiving opportunities and others decreasing it.

4.3.2.2 Influence of Social Media Platform Usage on Gemini Opportunities

Table 4.57 Omnibus Test of the Model's Performance (Social Media Platform Usage on Gemini Opportunities)

		Chi-square	df	Sig.
Step 1	Step	47.186	5	0.000
	Block	47.186	5	0.000
	Model	47.186	5	0.000

Table 4.57 presents the Omnibus Test of Model Coefficients for a logistic regression analysis investigating the influence of social media platform usage on perceived opportunities associated with Gemini. The results demonstrate a statistically significant model fit (X^2 = 47.186, df = 5, p < 0.001). This chi-square value represents a significant improvement in model fit achieved by including the predictor variables (social media platform usage) compared to a null model with no predictors. The highly significant p-value (p < 0.001) provides strong evidence against the null hypothesis, indicating that the model with predictors is significantly better than the intercept-only model. The consistency of the chi-square values across Step, Block, and Model rows

suggests that all social media platform variables were entered simultaneously in a single block. These findings highlight the importance of social media use patterns in predicting perceptions of Gemini opportunities.

Table 4.58 The Model Summary (Social Media Platform Usage on Gemini Opportunities)

Step	-2 log likelihood	Cox & Snell R square	Nagelkerke R square
1	1547.698[a]	0.040	0.053

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Table 4.58 presents the Model Summary for the logistic regression analysis examining the influence of social media platform usage on perceived opportunities associated with Gemini. The -2 Log likelihood value of 1547.698 represents the unexplained variance in the model, with lower values indicating better fit. The pseudo R-square measures provide insight into the model's explanatory power. The Cox & Snell R Square value of 0.040 suggests that approximately 4.0% of the variation in perceived Gemini opportunities is explained by the social media platform usage variables. The Nagelkerke R Square, which can reach a maximum of 1, indicates that the model explains about 5.3% of the variance in perceived opportunities. These results demonstrate that while social media engagement contributes significantly to the model (as indicated by the Omnibus test), its practical impact on explaining perceptions of Gemini opportunities is minimal.

Table 4.59 Classification Table for Back-Testing (Social Media Platform Usage on Gemini Opportunities)

Observed			Predicted		
			Gemini Opportunities		Percentage correct
			No	Yes	
Step 1	Gemini Opportunities	No	463	175	72.6%
		Yes	397	124	23.8%
	Overall percentage				50.6%

Note The cut-off value is .500.

Table 4.59 presents the Classification Table for the logistic regression model predicting perceived opportunities associated with Gemini based on social media platform usage. This table assesses the model's predictive accuracy using a standard cut-off value of 0.500. The model demonstrates a modest overall predictive performance, correctly classifying 50.6% of all cases, which is only marginally better than chance.

Table 4.60 Variables in the Model (Social Media Platform Usage on Gemini Opportunities)

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Facebook	-1.152	0.807	2.040	1	0.153	0.316
	Instagram	-0.077	0.215	0.128	1	0.720	0.926
	X	-0.130	0.130	0.996	1	0.318	0.878
	TikTok	1.004	0.203	24.539	1	0.000	2.729
	YouTube	0.137	0.711	0.037	1	0.847	1.147
	Constance	0.165	0.455	0.131	1	0.717	1.179

a. Variable(s) entered in step 1: Facebook, Instagram, X, TikTok, YouTube

The predictive regression equation of Model 14 using the coefficients from Table 4.60 can be described by the following equation:

$$P = \frac{1}{1 + e^{-z}}$$

where P is opportunities by Gemini in Thailand,

Z = 0.165 + 1.004(TikTok).

Table 4.60 presents the Variables in the Model for the logistic regression analysis examining the influence of social media platform usage on perceived opportunities associated with Gemini. The results reveal that among the various social media platforms, only TikTok usage emerges as a statistically significant predictor (B = 1.004, $p < 0.001$, Exp(B) = 2.729). This indicates that TikTok users are approximately 2.7 times more likely to perceive opportunities associated with Gemini compared to non-users. Interestingly, other major platforms such as Facebook ($p = 0.153$), Instagram ($p = 0.720$), X (formerly Twitter) ($p = 0.318$), and YouTube ($p = 0.847$) do not show statistically significant associations with perceiving Gemini opportunities. These findings highlight the unique role of TikTok in shaping perceptions of Gemini opportunities, while other platforms appear to have limited influence. This stark contrast in the impact of different social media platforms underscores the complex and platform-specific nature of how social media engagement relates to perceptions of AI technologies like Gemini. The results suggest that the type of content or user interactions specific to TikTok may be particularly influential in fostering positive perceptions of Gemini's potential opportunities.

4.3.2.3 Influences of Demographic, Awareness, and Social Media Platform Usage Factors on Gemini Opportunities, Using Only Significant Variables

Table 4.61 Omnibus Test of the Model's Performance (Demographic, Awareness, and Social Media Platform Usage Factors on Gemini Opportunities, Using Only Significant Variables)

		Chi-square	df	Sig.
Step 1	Step	136.825	6	0.000
	Block	136.825	6	0.000
	Model	136.825	6	0.000

Table 4.61 presents the Omnibus Test of Model Coefficients for a logistic regression analysis investigating the combined influence of demographics, awareness, and social media platform usage on perceived opportunities associated with Gemini. The results demonstrate a highly significant model fit ($X^2 = 136.825$, df = 6, $p < 0.001$). This substantial chi-square value represents a significant improvement in model fit achieved by including the predictor variables compared to a null model. The highly significant p-value ($p < 0.001$) provides strong evidence against the null hypothesis, indicating that the model with predictors is significantly better than the intercept-only model. The consistency of the chi-square values across Step, Block, and Model rows suggests that all variables were entered simultaneously in a single block. Notably, the chi-square value (136.825) is larger than those observed in the previous models examining demographics and social media usage separately for Gemini opportunity perception. This indicates that the combined model offers a more comprehensive explanation of how individuals perceive opportunities associated with Gemini. These results underscore the importance of considering both individual characteristics and social media behavior in predicting perceptions of AI technology opportunities, while also highlighting potential differences in how these factors influence perceptions of different AI tools.

Table 4.62 The Model Summary (Demographic, Awareness, and Social Media Platform Usage Factors on Gemini Opportunities, Using Only Significant Variables)

Step	-2 log likelihood	Cox & Snell R square	Nagelkerke R square
1	1458.059[a]	0.111	0.149

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Table 4.62 presents the Model Summary for the logistic regression analysis examining the combined influence of demographics, awareness, and social media platform usage on perceived opportunities associated with Gemini. The -2 Log likelihood value of 1458.059 indicates the unexplained variance in the model, with this lower value suggesting a better fit compared to previous models for Gemini opportunity perception. The pseudo R-square measures provide insight into the model's explanatory power. The Cox & Snell R Square value of 0.111 suggests that approximately 11.1% of the variation in perceived Gemini opportunities is explained by the included variables. The Nagelkerke R Square, which can reach a maximum of 1, indicates that the model explains about 14.9% of the variance in perceived opportunities. This represents an improvement over the previous models that considered demographics and social media usage separately for Gemini opportunity perception. These results suggest that while the integration of demographics, awareness, and social media usage provides a more comprehensive explanation of factors influencing perceptions of Gemini opportunities compared to individual models, there remains a substantial portion of unexplained variance. This underscores the complex nature of how individuals assess the potential benefits of AI tools like Gemini and suggests that additional factors not captured in this model may play significant roles in shaping these perceptions.

Table 4.63 Classification Table for Back-Testing (Demographic, Awareness, and Social Media Platform Usage Factors on Gemini Opportunities, Using Only Significant Variables)

Observed			Predicted: Gemini Opportunities No	Predicted: Gemini Opportunities Yes	Percentage correct
Step 1	Gemini	No	441	197	69.1%
	Opportunities	Yes	244	277	53.2%
	Overall percentage				61.9%

Note The cut-off value is .500.

Table 4.63 presents the Classification Table for the logistic regression model predicting perceived opportunities associated with Gemini based on the combined influence of demographics, awareness, and social media platform usage. This table assesses the model's predictive accuracy using a standard cut-off value of 0.500. The model demonstrates a moderate overall predictive performance, correctly classifying

61.9% of all cases. The model outperforms previous models that considered demographics and social media usage separately for Gemini opportunity perception, indicating that the combination of these factors provides a more comprehensive and accurate prediction of how individuals perceive opportunities associated with Gemini.

Table 4.64 Variables in the Model (Demographic, Awareness, and Social Media Platform Usage Factors on Gemini Opportunities, Using Only Significant Variables)

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Score	-0.417	0.069	36.744	1	0.000	0.659
	Gender	-1.430	0.242	34.867	1	0.000	0.239
	Age	-0.280	0.075	14.011	1	0.000	0.756
	Education	1.111	0.135	67.520	1	0.000	3.037
	Status	0.134	0.201	0.440	1	0.507	1.143
	TikTok	0.796	0.194	16.826	1	0.000	2.216
	Constance	2.997	0.689	18.906	1	0.000	20.029

a. Variable(s) entered in step 1: Score, gender, age, education, status, TikTok

The predictive regression equation of Model 15 using the coefficients from Table 4.64 can be described by the following equation:

$$P = \frac{1}{1+e^{-z}}$$

where P is opportunities by Gemini in Thailand,

Z = 2.997 – 0.417(score) – 1.430(gender) – 0.280(age) + 1.111(education) + 0.796(TikTok).

Table 4.64 presents the Variables in the Model for the logistic regression analysis examining the combined influence of demographics, awareness, and social media platform usage on perceived opportunities associated with Gemini. Most variables in the model show statistical significance ($p < 0.05$). The 'Score' variable, representing awareness, shows a significant negative relationship ($B = -0.417$, $p < 0.001$, $Exp(B) = 0.659$), indicating that higher scores are associated with lower odds of perceiving opportunities. Gender emerges as a strong negative predictor ($B = -1.430$, $p < 0.001$, $Exp(B) = 0.239$), suggesting one gender category is significantly less likely to perceive opportunities. Age demonstrates a negative association ($B = -0.280$, $p < 0.001$, $Exp(B) = 0.756$), implying a decrease in perceived opportunities with increasing age. Education level shows a strong positive relationship ($B = 1.111$, $p < 0.001$, $Exp(B) = 3.037$), indicating higher education is associated with increased odds of perceiving opportunities. Notably, status is not significant in this model ($p = 0.507$). Among social media platforms, only TikTok usage shows a significant positive association ($B = 0.796$, $p < 0.001$, $Exp(B) = 2.216$) with perceiving Gemini opportunities. These findings highlight the complex interplay of demographic factors, awareness, and social media usage in predicting perceptions of Gemini opportunities, with education and TikTok usage emerging as positive predictors, while gender, age, and awareness show negative associations. This suggests that perceptions of AI opportunities related to Gemini are shaped by a nuanced combination of individual characteristics, awareness levels, and specific social media engagement, with some factors increasing the likelihood of perceiving opportunities and others decreasing it.

4.3.2.4 Influence of Demographics and Awareness on Gemini Disruptions

Table 4.65 Omnibus Test of the Model's Performance (Demographics and Awareness on Gemini Disruptions)

		Chi-square	df	Sig.
Step 1	Step	225.706	6	0.000
	Block	225.706	6	0.000
	Model	225.706	6	0.000

Table 4.65 presents the Omnibus Test of Model Coefficients for a logistic regression analysis investigating the influence of demographics and awareness on perceived disruptions associated with Gemini. The results demonstrate a statistically significant model fit ($X^2 = 225.706$, df = 6, $p < 0.001$). This substantial chi-square value represents a significant improvement in model fit achieved by including the predictor variables (demographics and awareness) compared to a null model with no predictors. The highly significant p-value ($p < 0.001$) provides strong evidence against the null hypothesis, indicating that the model with predictors is significantly better than the intercept-only model. The consistency of the chi-square values across Step, Block, and Model rows suggests that all variables were entered simultaneously in a single block. These results underscore the collective importance of demographic factors and awareness in predicting perceptions of Gemini disruptions.

Table 4.66 The Model Summary (Demographics and Awareness on Gemini Disruptions)

Step	-2 log likelihood	Cox & Snell R square	Nagelkerke R square
1	1375.344[a]	0.177	0.236

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Table 4.66 presents the Model Summary for the logistic regression analysis examining the influence of demographics and awareness on perceived disruptions associated with Gemini. The -2 Log likelihood value of 1375.344 represents the unexplained variance in the model, with lower values indicating better fit. The pseudo R-square measures provide insight into the model's explanatory power. The Cox & Snell R Square value of 0.177 suggests that approximately 17.7% of the variation in perceived Gemini disruptions is explained by the demographic and awareness variables. The Nagelkerke R Square, which can reach a maximum of 1, indicates that the model explains about 23.6% of the variance in perceived disruptions. This suggests that demographics and awareness play a substantial role in explaining how individuals perceive potential disruptions associated with Gemini.

Table 4.67 Classification Table for Back-Testing (Demographics and Awareness on Gemini Disruptions)

Observed			Predicted		
			Gemini Disruptions		Percentage correct
			No	Yes	
Step 1	Gemini	No	358	262	57.7%
	Disruptions	Yes	187	352	65.3%
	Overall percentage				61.3%

Note The cut-off value is .500.

Table 4.67 presents the Classification Table for the logistic regression model predicting perceived disruptions associated with Gemini based on demographics and awareness. This table assesses the model's predictive accuracy using a standard cut-off value of 0.500. The model demonstrates a moderate overall predictive performance, correctly classifying 61.3% of all cases. The model's performance is above chance, indicating that demographics and awareness are meaningful predictors of how individuals perceive potential disruptions associated with Gemini.

Table 4.68 Variables in the Model (Demographics and Awareness on Gemini Disruptions)

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Score	-0.495	0.068	52.822	1	0.000	0.610
	Gender	0.290	0.243	1.422	1	0.233	1.336
	Age	-0.687	0.081	71.779	1	0.000	0.503
	Education	0.656	0.132	24.770	1	0.000	1.927
	Status	1.073	0.179	35.950	1	0.000	2.923
	Income	0.232	0.078	8.846	1	0.003	1.261
	Constance	3.695	0.655	31.840	1	0.000	40.253

a. Variable(s) entered in step 1: score, gender, age, education, status, income

The predictive regression equation of Model 16 using the coefficients from Table 4.68 can be described by the following equation:

$$P = \frac{1}{1 + e^{-z}}$$

where P is disruptions by Gemini in Thailand,

Z = 3.695 – 0.495(score) – 0.687(age) + 0.656(education) + 1.073(status) + 0.232(income).

Table 4.68 presents the Variables in the Model for the logistic regression analysis examining the influence of demographics and awareness on perceived disruptions associated with Gemini. Most variables in the model show statistical significance ($p < 0.05$). The 'Score' variable, representing awareness, shows a significant negative relationship (B = -0.495, $p < 0.001$, Exp(B) = 0.610), indicating that higher scores are associated with lower odds of perceiving disruptions. Age demonstrates a strong negative association (B = -0.687, $p < 0.001$, Exp(B) = 0.503), implying a substantial decrease in perceived disruptions with increasing age. Education level shows a positive relationship (B = 0.656, $p < 0.001$, Exp(B) = 1.927), indicating higher education is associated with increased odds of perceiving disruptions. Status (B = 1.073, $p < 0.001$, Exp(B) = 2.923) and income (B = 0.232, $p = 0.003$, Exp(B) = 1.261) both show positive associations with perceiving disruptions. Notably, gender does not reach statistical significance in this model ($p = 0.233$). The constant term is positive and significant (B = 3.695, $p < 0.001$). These findings highlight the complex interplay of demographic factors and awareness in predicting perceptions of Gemini disruptions. Education, status, and income emerge as positive predictors, while age and awareness show negative associations. This suggests that perceptions of AI disruptions related to Gemini are shaped by a nuanced combination of individual characteristics and awareness levels, with some factors increasing the likelihood of perceiving disruptions and others decreasing it.

4.3.2.5. Influence of Social Media Platform Usage on Gemini Disruptions

Table 4.69 Omnibus Test of the Model's Performance (Social Media Platform Usage on Gemini Disruptions)

		Chi-square	df	Sig.
Step 1	Step	30.118	5	0.000
	Block	30.118	5	0.000
	Model	30.118	5	0.000

Table 4.69 presents the Omnibus Test of Model Coefficients for a logistic regression analysis investigating the influence of social media platform usage on perceived disruptions associated with Gemini. The results demonstrate a statistically significant model fit ($X^2 = 30.118$, df = 5, $p < 0.001$). This chi-square value represents a significant improvement in model fit achieved by including the predictor variables (social media platform usage) compared to a null model with no predictors. The highly significant p-value ($p < 0.001$) provides strong evidence against the null hypothesis, indicating that the model with predictors is significantly better than the intercept-only model. The consistency of the chi-square values across Step, Block, and Model rows suggests that all social media platform variables were entered simultaneously in a single block. These findings highlight the importance of social media use patterns in predicting perceptions of Gemini disruptions.

Table 4.70 The Model Summary (Social Media Platform Usage on Gemini Disruptions)

Step	-2 log likelihood	Cox & Snell R square	Nagelkerke R square
1	1570.931[a]	0.026	0.034

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Table 4.70 presents the Model Summary for the logistic regression analysis examining the influence of social media platform usage on perceived disruptions associated with Gemini. The -2 Log likelihood value of 1570.931 represents the unexplained variance in the model, with lower values indicating better fit. The pseudo R-square measures provide insight into the model's explanatory power. The Cox & Snell R Square value of 0.026 suggests that approximately 2.6% of the variation in perceived Gemini disruptions is explained by the social media platform usage variables. The Nagelkerke R Square, which can reach a maximum of 1, indicates that the model explains about 3.4% of the variance in perceived disruptions. This suggests that social media usage patterns play a limited role in explaining how individuals perceive potential disruptions associated with Gemini.

Table 4.71 Classification Table for Back-Testing (Social Media Platform Usage on Gemini Disruptions)

Observed			Predicted: Gemini Disruptions No	Predicted: Gemini Disruptions Yes	Percentage correct
Step 1	Gemini Disruptions	No	453	167	73.1%
		Yes	415	124	23.0%
	Overall percentage				49.8%

Note The cut-off value is .500.

Table 4.71 presents the Classification Table for the logistic regression model predicting perceived disruptions associated with Gemini based on social media platform usage. This table assesses the model's predictive accuracy using a standard cut-off value of 0.500. The model demonstrates a modest overall predictive performance, correctly classifying 49.8% of all cases, which is slightly below chance level.

Table 4.72 Variables in the Model (Social Media Platform Usage on Gemini Disruptions)

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Facebook	-0.923	0.791	1.360	1	0.244	0.398
	Instagram	-0.671	0.217	9.585	1	0.002	0.511
	X	-0.188	0.129	2.143	1	0.143	0.828
	TikTok	1.054	0.206	26.179	1	0.000	2.869
	YouTube	0.711	0.709	1.007	1	0.316	2.036
	Constance	-0.076	0.430	0.031	1	0.860	0.927

a. Variable(s) entered in step 1: Facebook, Instagram, X, TikTok, YouTube

The predictive regression equation of Model 17 using the coefficients from Table 4.72 can be described by the following equation:

$$P = \frac{1}{1+e^{-z}}$$

where P is disruptions by Gemini in Thailand,

Z = – 0.076 – 0.671(Instagram) + 1.054(TikTok).

Table 4.72 presents the Variables in the Model for the logistic regression analysis examining the influence of social media platform usage on perceived disruptions associated with Gemini. The results reveal varying effects across different platforms, with only two reaching statistical significance. TikTok usage shows a strong positive association ($B = 1.054$, $p < 0.001$, $Exp(B) = 2.869$), indicating that TikTok users are approximately 2.9 times more likely to perceive disruptions associated with Gemini. Conversely, Instagram usage demonstrates a negative relationship ($B = -0.671$, $p = 0.002$, $Exp(B) = 0.511$), suggesting that Instagram users are about 48.9% less likely to perceive disruptions. Interestingly, Facebook ($p = 0.244$), X (formerly Twitter) ($p = 0.143$), and YouTube ($p = 0.316$) do not reach statistical significance. These findings highlight the differential impacts of various social media platforms on perceptions of

Gemini disruptions, with TikTok usage positively associated with disruption perception and Instagram usage negatively associated. This underscores the complex relationship between social media engagement and views on AI technology, suggesting that the type of social media platform used may significantly influence how individuals perceive the potential disruptive effects of AI tools like Gemini.

4.3.2.6. Influences of Demographic, Awareness, and Social Media Platform Usage Factors on Gemini Disruptions, Using Only Significant Variables

Table 4.73 Omnibus Test of the Model's Performance (Demographic, Awareness, and Social Media Platform Usage Factors on Gemini Disruptions, Using Only Significant Variables)

		Chi-square	df	Sig.
Step 1	Step	292.757	7	0.000
	Block	292.757	7	0.000
	Model	292.757	7	0.000

Table 4.73 presents the Omnibus Test of Model Coefficients for a logistic regression analysis investigating the combined influence of demographics, awareness, and social media platform usage on perceived disruptions associated with Gemini. The results demonstrate a highly significant model fit ($X^2 = 292.757$, df = 7, $p < 0.001$). This substantial chi-square value represents a significant improvement in model fit achieved by including the predictor variables compared to a null model. The highly significant p-value ($p < 0.001$) provides strong evidence against the null hypothesis, indicating that the model with predictors is significantly better than the intercept-only model. The consistency of the chi-square values across Step, Block, and Model rows suggests that all variables were entered simultaneously in a single block. Notably, the chi-square value (292.757) is considerably larger than those observed in the previous models examining demographics and social media usage separately for Gemini disruption perception. This indicates that the combined model offers a more comprehensive explanation of how individuals perceive disruptions associated with Gemini. The

increased chi-square value underscores the importance of considering both individual characteristics and social media behavior in predicting perceptions of AI technology disruptions. This combined approach yields a more robust predictive model for understanding views on Gemini's potential disruptive effects, highlighting the complex interplay between personal factors and social media engagement in shaping these perceptions.

Table 4.74 The Model Summary (Demographic, Awareness, and Social Media Platform Usage Factors on Gemini Disruptions, Using Only Significant Variables)

Step	-2 log likelihood	Cox & Snell R square	Nagelkerke R square
1	1308.293[a]	0.223	0.298

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Table 4.74 presents the Model Summary for the logistic regression analysis examining the combined influence of demographics, awareness, and social media platform usage on perceived disruptions associated with Gemini. The -2 Log likelihood value of 1308.293 indicates the unexplained variance in the model, with this lower value suggesting a better fit compared to previous models for Gemini disruption perception. The pseudo R-square measures provide insight into the model's explanatory power. The Cox & Snell R Square value of 0.223 suggests that approximately 22.3% of the variation in perceived Gemini disruptions is explained by the included variables. The Nagelkerke R Square, which can reach a maximum of 1, indicates that the model explains about 29.8% of the variance in perceived disruptions. This represents a substantial improvement over the previous models that considered demographics and social media usage separately for Gemini disruption perception. The higher Nagelkerke R Square value suggests that this combined model offers a more comprehensive explanation of the factors influencing how individuals perceive disruptions associated with Gemini. These results underscore the value of integrating multiple factors – demographics, awareness, and social media usage – in understanding perceptions of AI technology disruptions, providing a more holistic view of how individuals assess the potential disruptive impacts of tools like Gemini.

Table 4.75 Classification Table for Back-Testing (Demographic, Awareness, and Social Media Platform Usage Factors on Gemini Disruptions, Using Only Significant Variables)

Observed			Predicted		
			Gemini Disruptions		Percentage correct
			No	Yes	
Step 1	Gemini	No	428	192	69.0%
	Disruptions	Yes	220	319	59.2%
	Overall percentage				64.5%

Note The cut-off value is .500.

Table 4.75 presents the Classification Table for the logistic regression model predicting perceived disruptions associated with Gemini based on the combined influence of demographics, awareness, and social media platform usage. This table assesses the model's predictive accuracy using a standard cut-off value of 0.500. The model demonstrates a moderate overall predictive performance, correctly classifying 64.5% of all cases. The model performs significantly better than chance and outperforms previous individual models, indicating that the combination of demographics, awareness, and social media usage provides a more comprehensive foundation for predicting perceptions of Gemini disruptions.

Table 4.76 Variables in the Model (Demographic, Awareness, and Social Media Platform Usage Factors on Gemini Disruptions, Using Only Significant Variables)

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Score	-0.327	0.070	21.925	1	0.000	0.721
	Age	-0.903	0.085	112.888	1	0.000	0.405
	Education	0.900	0.126	51.425	1	0.000	2.460
	Status	2.191	0.236	86.288	1	0.000	8.946
	Income	0.284	0.083	11.566	1	0.000	1.328
	Instagram	0.450	0.266	2.858	1	0.091	1.568
	TikTok	1.382	0.240	33.288	1	0.000	3.985
	Constance	0.728	0.739	0.968	1	0.325	2.070

a. Variable(s) entered in step 1: Score, gender, age, education, status, income, Facebook, Instagram, X, TikTok

The predictive regression equation of Model 18 using the coefficients from Table 4.76 can be described by the following equation:

$$P = \frac{1}{1+e^{-z}}$$

where P is disruptions by Gemini in Thailand,

Z = 0.728 – 0.327(score) – 0.903(age) + 0.900(education) + 2.191(status) + 0.284(income) + 1.382(TikTok).

Table 4.76 presents the Variables in the Model for the logistic regression analysis examining the combined influence of demographics, awareness, and social media platform usage on perceived disruptions associated with Gemini. Most variables in the model show statistical significance ($p < 0.05$). The 'Score' variable shows a significant negative relationship (B = -0.327, $p < 0.001$, Exp(B) = 0.721), indicating that higher scores are associated with lower odds of perceiving disruptions. Age reveals a strong negative association ($B = -0.903$, $p < 0.001$, $Exp(B) = 0.405$), implying a substantial decrease in perceived disruptions with increasing age. Education level shows a positive relationship ($B = 0.900$, $p < 0.001$, $Exp(B) = 2.460$), indicating higher education is associated with increased odds of perceiving disruptions. Status emerges as a strong positive predictor ($B = 2.191$, $p < 0.001$, $Exp(B) = 8.946$), suggesting statuses (being single) are significantly more likely to perceive disruptions. Income also shows a positive association ($B = 0.284$, $p = 0.001$, $Exp(B) = 1.328$). Among social media platforms, TikTok usage depicts a strong positive relationship ($B = 1.382$, $p < 0.001$, $Exp(B) = 3.985$) with perceiving Gemini disruptions. Interestingly, Instagram usage approaches but does not reach statistical significance ($p = 0.091$). These findings highlight the complex interplay of various factors in predicting perceptions of Gemini disruptions, with education, status, income, and TikTok usage emerging as positive predictors, while age and awareness show negative associations. This suggests that perceptions of AI disruptions related to Gemini are shaped by a nuanced combination of individual characteristics, awareness levels, and specific social media engagement.

4.3.3 Opportunities and Disruptions: A Qualitative Analysis

The integration of AI technologies, such as ChatGPT and Gemini, across sectors including education, and the creative economy and tourism, offers a wide array of opportunities and potential disruptions. This technological infusion can enhance educational outcomes, streamline operations, and create novel experiences in tourism and creative industries. However, it also introduces challenges such as potential job displacement, privacy concerns, and the risk of exacerbating existing inequalities.

Figure 4.1 visually represents the outcomes as a word cloud of key terms from the interviews on opportunities and disruptions related to ChatGPT and Gemini, highlighting the most frequently used words. This visualization, produced using a word frequency query in NVivo, enhances the clarity of the results. In this visualization, larger words denote higher frequency or greater prominence within the text, while smaller words appear less frequently. The use of color and arrangement in the word cloud enhances visual appeal but generally does not convey specific meanings unless explicitly indicated.

Figure 4.1 Word Cloud on Opportunities and Disruptions by ChatGPT and Gemini

Source: Researcher

As presented in Figure 4.1, this word cloud visualization provides a thematic overview of key concepts related to the intersection of AI, particularly ChatGPT and Gemini, with education and tourism sectors. The prominence of terms such as “educational,” “learning,” “students,” and “experiences” suggests a strong focus on AI's impact on educational practices and outcomes. Simultaneously, the presence of “tourism,” “economy,” and “businesses” indicates consideration of AI's role in the tourism industry and broader economic implications. The centrality and size of “AI,” “ChatGPT,” and “Gemini” underscore their significance as the primary AI technologies being discussed. Terms like “creative,” “personalized,” and “enhancing” point to the potential benefits and applications of these AI tools in both education and tourism contexts. The inclusion of words such as “concerns,” “challenges,” and “risks” suggests a balanced approach that also considers potential drawbacks or obstacles in AI adoption. The diversity of terms reflects a multifaceted analysis, touching on aspects like efficiency, innovation, integration, and data management. This comprehensive view indicates a nuanced examination of how AI technologies are reshaping educational methodologies and tourism experiences, while also considering broader societal and economic impacts. The visualization effectively captures the complex interplay between AI technologies and their applications in these key sectors.

Figure 4.2 visually represents the outcomes as a tree map of key terms from the interviews on opportunities and disruptions related to ChatGPT and Gemini.

Figure 4.2 Tree Map on Opportunities and Disruptions by ChatGPT and Gemini

Source: Researcher

This treemap visualization provides a comprehensive overview of the opportunities and disruptions presented by AI technologies, specifically ChatGPT and Gemini, across various sectors, with a particular focus on education and tourism. The prominence of terms such as “AI,” “ChatGPT,” and “Gemini” underscores their central role in driving these changes. In the educational sphere, words like “learning,” “students,” “teaching,” and “teachers” highlight the potential for AI to transform traditional pedagogical approaches. Terms such as “personalized,” “enhancing,” and “interactive” suggest opportunities for more tailored and engaging educational experiences. However, the presence of “challenges” and “concerns” indicates that this transformation is not without its complexities. The tourism sector is represented by terms like “travel,” “cultural,” and “experiences,” pointing to AI's potential to revolutionize travel planning and cultural engagement. The inclusion of “virtual” hints at emerging trends in digital tourism experiences. Broader implications are evident through terms like “economy,” “business,” and “market,” suggesting AI's far-reaching economic impact. Words such as “creative,” “innovation,” and “disrupt” highlight the transformative potential of these technologies across industries. The map also touches on important considerations like “privacy,” “ethics,” and “adapt,” indicating the need for thoughtful implementation and regulation of AI technologies. Terms such as “skills,” “roles,” and “job” reflect the changing nature of work and the necessity for workforce adaptation. Overall, this treemap effectively captures the dual nature of AI's impact – presenting significant opportunities for enhancement and innovation across sectors, while also introducing disruptions that necessitate careful navigation and adaptation.

Figure 4.3 visually represents the outcomes as a word tree, using text search query via NVivo software, from the interviews on opportunities and disruptions related to ChatGPT and Gemini.

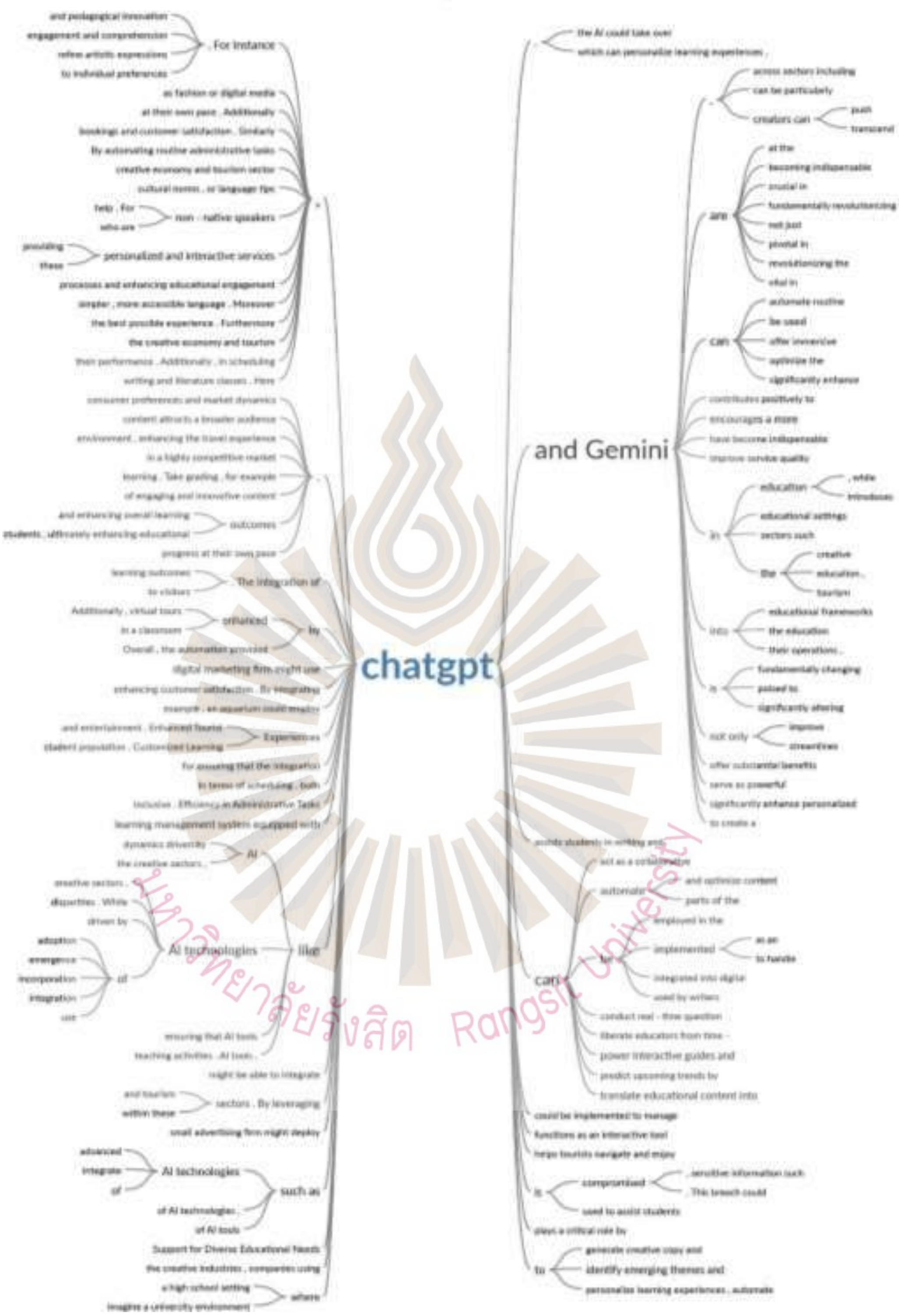

Figure 4.3 Word Tree on Opportunities and Disruptions by ChatGPT and Gemini

Source: Researcher

As displayed in Figure 4.3, this word tree visualization provides a comprehensive overview of the opportunities and potential disruptions presented by ChatGPT and Gemini across various sectors, particularly in education and tourism. The central nodes “ChatGPT” and “Gemini” branch out to illustrate the multifaceted impact of these AI technologies. In the educational sphere, the tree highlights how these tools are “fundamentally revolutionizing” learning experiences, offering personalized and interactive services that enhance student engagement and comprehension. They are shown to assist in writing, automate routine tasks, and “significantly enhance personalized” learning outcomes. The potential to “translate educational content” and “predict upcoming trends” suggests a shift towards more adaptive and forward-looking educational frameworks. The tourism and creative economy sectors are also prominently featured, with AI tools being utilized to enhance customer satisfaction, optimize content, and provide personalized experiences. The tree indicates that these technologies can “improve service quality” and “enhance guest services,” potentially disrupting traditional approaches to tourism and entertainment. However, the visualization also alludes to potential disruptions and challenges. Phrases like “the AI could take over” and “compromised ... sensitive information” hint at concerns regarding job displacement and data security. The need for continuous adaptation is evident in references to “automate routine” tasks and the imperative to “integrate” AI technologies across various sectors. The tree also emphasizes the transformative potential of these technologies in content creation, market analysis, and operational efficiency across industries. It suggests that ChatGPT and Gemini are becoming “indispensable” tools that are “poised to” and “significantly altering” traditional practices in multiple domains. Overall, this word tree effectively captures the dual nature of AI's impact – presenting significant opportunities for enhancement and innovation across sectors, while also introducing disruptions that necessitate careful consideration and adaptation in educational, tourism, and creative industry landscapes.

4.3.3.1 Opportunities in Education and Creative Economy and Tourism

The adoption of AI technologies like ChatGPT and Gemini into the education sector and the creative economy and tourism is creating significant opportunities. In education, AI enables personalized learning experiences, enhancing student engagement and outcomes. Meanwhile, in the creative economy and tourism, AI improves customer interactions through customized marketing and enriched experiences, boosting efficiency and opening new revenue streams. This evolution marks a transformative phase in how services are delivered and consumed across these sectors.

(1) Opportunities in Education Sector

In the education sector, the study's primary themes emerging from the integration of AI technologies include the provision of customized learning experiences, enhanced efficiency in administrative tasks, and robust support for diverse educational needs. These advances highlight AI's potential to transform educational paradigms, making learning more individualized, accessible, and inclusive. This shift not only improves educational outcomes but also revolutionizes teaching methods, catering effectively to a diverse student population.

(1.1) Customized Learning Experiences

ChatGPT and Gemini significantly enhance personalized learning experiences by tailoring educational content to match individual student profiles, thus improving both engagement and comprehension. For instance, ChatGPT can be integrated into digital learning platforms to function as a responsive tutor, offering real-time, interactive dialogue and tailored instructional guidance. This could manifest in a high school setting where ChatGPT assists students in writing and literature by providing customized feedback, generating practice questions based on previous responses, and adapting complexity to fit each student's progress. This method not only improves the learning pace and retention but also allows educators to focus more on critical thinking and discussion facilitation. Meanwhile, Gemini could be deployed in a university's online course, dynamically adjusting the curriculum based on analytics that measure student engagement and understanding. This AI-driven approach ensures that educational material is neither too challenging nor too simplistic, thereby maintaining an optimal learning curve and maximizing educational outcomes for each student. By adapting to each learner's unique needs, these AI tools foster a more efficient, engaging, and effective educational environment.

> “These AI technologies are fundamentally transforming how we deliver education by tailoring content to match individual student profiles, which significantly boosts both engagement and comprehension. For example, imagine a university environment where ChatGPT is used to assist students in writing and literature classes. Here, ChatGPT functions as an interactive tool that not only gives customized feedback on students' written assignments but also generates practice questions based on their previous responses. It can adjust the complexity of these questions and the feedback provided, ensuring that it matches each student’s progress and learning needs” (R1, personal communication, May 12, 2024).

> “This AI integration allows teachers to shift their focus from the basics of subject matter delivery to more critical aspects such as facilitating discussions and enhancing critical thinking skills. With AI handling the personalization of learning materials and basic assessments, educators can devote more time to interactive and higher-order teaching activities” (R4, personal communication, May 14, 2024).

> “AI tools, like ChatGPT and Gemini, can be particularly effective in university settings, for instance, within online courses. They dynamically adjust the curriculum based on detailed analytics that track student engagement and understanding, ensuring that the educational content is appropriately challenging—never too difficult or too easy. Such an approach helps maintain an optimal learning curve and maximizes educational outcomes by

continuously adapting to the needs of each student" (R7, personal communication, May 15, 2024).

"These technologies encourage personalized learning and improve the overall educational framework. These AI tools promote more efficient, engaging, and effective learning environments by providing education that is closely aligned with each learner's specific needs. This personalized approach ensures that students reach their full potential, which improves overall educational outcomes. The use of AI in education is more than simply integrating technology into the classroom; it is about rethinking and improving educational paradigms to make learning more adaptive and inclusive" (R10, personal communication, May 20, 2024).

(1.2) Efficiency in Administrative Tasks

ChatGPT and Gemini can automate routine tasks such as grading, scheduling, and attendance management, allowing educators more time to focus on teaching and student interaction. By automating routine administrative tasks, ChatGPT can liberate educators from time-consuming duties, enabling them to dedicate more time to student engagement and pedagogical innovation. For instance, ChatGPT could be implemented to manage the entire grading process for objective-based assessments, such as multiple-choice questions or fill-in-the-blank tests. By instantly grading assignments and providing detailed feedback, the system not only speeds up the administrative process but also offers students immediate insights into their performance. Additionally, in scheduling, ChatGPT and Gemini can optimize the allocation of classrooms and resources. They can analyze data regarding course registrations, room capacities, and faculty availability to automatically generate schedules that minimize conflicts and ensure optimal use of institutional resources. This automation significantly eases the burden on administrative staff and improves the accuracy and efficiency of scheduling operations. Overall, the automation provided by ChatGPT and Gemini not only streamlines administrative processes but also allows educators to focus more on teaching and directly interacting with students. This shift from administrative duties to pedagogical engagement can lead to more innovative teaching methods and a more personalized learning experience for students, ultimately enhancing educational outcomes.

> "ChatGPT and Gemini are pivotal in automating routine tasks such as grading, scheduling, and attendance management. This automation significantly frees up educators' time, allowing them to focus more on direct teaching and student interactions, which are crucial for effective learning. Take grading, for example. ChatGPT can be implemented to handle the grading process for objective assessments like multiple-choice tests or fill-in-the-blanks. It can instantly evaluate assignments and offer detailed feedback, providing students with immediate insights into their academic performance. This not only accelerates the grading process but also enhances the feedback quality, which is vital for student learning" (R4, personal communication, May 14, 2024).

> "In terms of scheduling, both ChatGPT and Gemini can significantly enhance efficiency. They are capable of analyzing vast amounts of data, including course registrations, room capacities, and faculty availability. This allows them to generate optimized schedules that reduce conflicts and ensure the best use of available resources. For instance, they can allocate classrooms in a way that maximizes space utilization and aligns with teaching needs, which eases the burden on administrative staff" (R5, personal communication, May 15, 2024).

> "By reducing the time educators spend on administrative duties, these AI tools enable teachers to dedicate more energy to pedagogical innovation and personalized student engagement. This shift not only leads to more dynamic and effective teaching methods but also allows for a more tailored educational experience for each student. Ultimately, this can lead to higher student satisfaction and better educational outcomes" (R6, personal communication, May 15, 2024).

> "These technologies could lead to significant improvements in the educational system. The broader implications are profound. By streamlining administrative processes and enhancing educational engagement, ChatGPT and Gemini are not just improving efficiency but are also driving a fundamental evolution in how education is delivered. They enable a more adaptive, responsive, and student-centered educational system, which is vital for meeting the diverse needs of contemporary learners and preparing them for future challenges" (R7, personal communication, May 15, 2024).

(1.3) Support for Diverse Educational Needs

ChatGPT and Gemini are at the forefront of enhancing inclusivity in education by supporting diverse educational needs through specialized programs. These AI technologies can be leveraged to design customized learning experiences that cater to students with various learning disabilities, language barriers, or those requiring advanced or remedial assistance. For example, Gemini could analyze a student's learning patterns and identify specific challenges, such as difficulties in understanding complex mathematical concepts or language comprehension issues. Based on this analysis, Gemini can then tailor the curriculum and provide targeted exercises that are adjusted to the appropriate difficulty level, ensuring that each student can progress at their own pace. Additionally, ChatGPT can be implemented as an interactive tool that supports students with special needs by breaking down learning materials into more manageable segments and using simpler, more accessible language. It can also offer real-time question and answer sessions for students who may need additional help outside of the standard classroom hours. For students who are non-native speakers, ChatGPT can translate educational content into their native languages, making learning more accessible and reducing language as a barrier to education. These technologies not only foster a more inclusive learning environment but also empower educators to better meet the needs of all students. By integrating these AI tools into educational frameworks, institutions can ensure that every student receives the support they need to succeed academically, thereby democratizing education and enhancing overall learning outcomes.

“ChatGPT and Gemini are crucial in enhancing inclusivity by supporting the diverse needs of students through specialized educational programs. These technologies allow for the design of customized learning experiences tailored to students with various challenges, such as learning disabilities, language barriers, or those in need of advanced or remedial assistance” (R1, personal communication, May 12, 2024).

“Gemini, for instance, can analyze a student’s learning patterns to identify particular challenges—like difficulties with complex mathematical concepts or language comprehension. Based on this analysis, Gemini can customize the curriculum and provide targeted exercises adjusted to the student’s appropriate difficulty level, allowing them to progress at their own pace” (R2, personal communication, May 12, 2024).

“ChatGPT plays a critical role by acting as an interactive support tool. For students with special needs, it can break down learning materials into more digestible segments and utilize simpler, more accessible language. Moreover, ChatGPT can conduct real-time question and answer sessions, offering additional support outside standard classroom hours, which is particularly beneficial for students requiring extra help. For non-native speakers, ChatGPT can translate educational content into the student's native language, significantly enhancing accessibility and reducing language barriers. This feature is critical in ensuring that education is equitable and accessible to all students, regardless of their linguistic background” (R7, personal communication, May 15, 2024).

“By fostering a more inclusive learning environment and empowering educators to meet the needs of all students effectively, these AI technologies democratize education. They ensure that every student receives the necessary support to succeed academically, enhancing overall learning outcomes. The integration of ChatGPT and Gemini into educational frameworks represents a significant step toward making education more adaptive and responsive to the diverse needs of the student population” (R10, personal communication, May 20, 2024).

(2) Opportunities in Creative Economy and Tourism Sector

In the creative economy and tourism sector, the themes emerging from the integration of AI technologies include creative content development, enhanced tourist experiences, and data-driven insights for business strategy. These themes highlight the potential of AI to innovate and streamline processes across these industries. AI-driven tools can generate new forms of creative content, personalize tourist engagements, and offer predictive analytics that refine marketing strategies and operational decisions. This technological adoption not only enriches the consumer experience but also provides businesses with the tools to adapt to changing market dynamics and consumer preferences effectively.

(2.1) Creative Content Development

In the creative economy and tourism sector, ChatGPT and Gemini are becoming indispensable tools for artists, writers, and designers by facilitating the creation of innovative and engaging content. These technologies enhance the creative process by providing new ways to generate ideas, automate routine tasks, and refine artistic expressions. For instance, ChatGPT can be used by writers to overcome creative blocks; it can suggest plot developments, character arcs, or even write dialogues, acting as a collaborative partner that brings a wealth of knowledge and data-driven suggestions to the creative table. Similarly, Gemini can be employed by designers in the tourism industry to create customized and interactive marketing materials that attract and engage visitors. For example, a tourism board could use Gemini to analyze current travel trends and visitor feedback to produce highly targeted promotional content that resonates with potential tourists' preferences and expectations. Gemini could also assist in developing virtual reality experiences that showcase destinations in immersive ways, allowing potential travelers to explore attractions virtually before booking their trips. These AI-driven approaches not only streamline the creative process but also open up new possibilities for innovation within the creative economy and tourism sectors. By leveraging ChatGPT and Gemini, creators can push the boundaries of traditional content creation, enhancing both the quality and uniqueness of their artistic outputs. This, in turn, can lead to greater cultural exchange and economic growth within these industries, as more engaging and personalized content draws in a wider audience.

> "These AI-driven approaches not only streamline the creative process but also open up new avenues for innovation within these sectors. By leveraging ChatGPT and Gemini, creators can transcend traditional content creation boundaries, enhancing the quality and uniqueness of their outputs. This leads to greater cultural exchange and economic growth, as more engaging and personalized content attracts a broader audience" (R11, personal communication, May 20, 2024).

> "ChatGPT and Gemini have become indispensable tools for artists, writers, and designers, greatly enhancing the creative process. These technologies provide innovative ways to generate ideas, automate routine tasks, and refine artistic expressions, significantly contributing to the creation of engaging and innovative content. ChatGPT can act as a collaborative partner to overcome creative blocks. It can suggest new plot developments, character arcs, or even help write dialogues. This makes it an invaluable resource for enhancing creativity and providing data-driven insights that enrich storytelling" (R15, personal communication, May 22, 2024).

> "In tourism, Gemini is particularly useful for designers creating customized and interactive marketing materials. For example, a tourism board might use Gemini to analyze current travel trends and visitor feedback, allowing them to produce promotional content that precisely aligns with potential tourists' preferences. Moreover, Gemini can aid in developing virtual reality experiences that allow potential travelers to virtually explore destinations

before booking their trips, enhancing the decision-making process" (R16, personal communication, May 23, 2024).

"AI is not just a tool for enhancing individual creativity; it is a transformative force reshaping entire industries. By integrating these technologies, the creative economy and tourism sectors can achieve higher levels of innovation and efficiency, paving the way for future advancements and cultural enrichment. This integration allows for the development of personalized and immersive experiences for tourists, efficient management of resources and services, and the creation of new forms of digital art and entertainment" (R19, personal communication, May 24, 2024).

(2.2) Enhanced Tourist Experiences

ChatGPT and Gemini are revolutionizing the tourism industry by enhancing tourist experiences through personalized travel advice, virtual tours, and interactive experiences. These AI technologies can tailor recommendations to individual preferences, such as suggesting destinations, activities, and dining options based on past behaviors, expressed interests, and even current local events. For example, Gemini could be employed by a travel agency to create dynamic itineraries that adapt to real-time weather conditions and local happenings, ensuring that travelers always have the best possible experience. Furthermore, ChatGPT can power interactive guides and virtual assistants available via mobile apps, providing tourists with instant access to information about landmarks, cultural norms, and language tips as they explore new places. This level of personalization significantly enhances the tourist experience, making travel smoother and more enjoyable. Additionally, virtual tours enhanced by ChatGPT and Gemini can offer immersive pre-visit previews of destinations. These tools can simulate walking tours through historic districts or natural parks, complete with rich narratives and contextual information that deepen the visitor's understanding and appreciation of the site. For instance, an aquarium could use Gemini to create a virtual reality tour that not only showcases marine life but also tells the stories behind different species and habitats, tailored to the viewer's pace and areas of interest.

By providing these personalized and interactive services, ChatGPT and Gemini improve service quality and elevate customer satisfaction in the tourism sector, helping businesses attract and retain more visitors in a highly competitive market.

> "ChatGPT and Gemini are fundamentally revolutionizing the tourism sector by significantly enhancing tourist experiences. These technologies offer personalized travel advice, virtual tours, and interactive experiences, all tailored to individual preferences. For instance, ChatGPT and Gemini can be used by travel agencies to create dynamic itineraries that adapt not just to a traveler's interests, but also to real-time factors such as weather conditions and local events. This ensures that the itinerary is always optimal and responsive to the environment, enhancing the travel experience" (R11, personal communication, May 20, 2024).

> "ChatGPT can power interactive guides and virtual assistants that can be accessed through mobile apps, giving tourists immediate access to critical information. Whether it is information about landmarks, cultural norms, or language tips, ChatGPT helps tourists navigate and enjoy their surroundings more fully as they visit new places" (R15, personal communication, May 22, 2024).

> "Virtual tours enhanced by these AI technologies can provide immersive previews of destinations before actual visits. For example, an aquarium could employ ChatGPT and Gemini to create a virtual reality tour that not only showcases marine life but also provides narrative content about the species and habitats. These tours are designed to be interactive and tailored to the viewer's pace and specific areas of interest, making them deeply engaging" (R16, personal communication, May 23, 2024).

> "By providing personalized and interactive services, ChatGPT and Gemini not only improve the quality of service but also significantly elevate customer

satisfaction. This personalization makes travel smoother and more enjoyable, helping tourism businesses to attract and retain visitors in a highly competitive market. The ability to tailor experiences so closely to individual preferences is a game-changer, setting new standards for service and efficiency in the tourism sector" (R17, personal communication, May 23, 2024).

(2.3) Data-Driven Insights for Business Strategy

In the creative economy and tourism, ChatGPT and Gemini serve as powerful tools for leveraging data-driven insights to refine business strategies and respond to evolving consumer preferences. These AI technologies can analyze vast amounts of data, including consumer trends, feedback, and market conditions, in real-time. This capability enables businesses to adapt their offerings and marketing strategies swiftly and effectively, ensuring they remain competitive and relevant. For example, a tourism company might use Gemini to parse through online reviews and social media posts to gauge visitor satisfaction and preferences regarding various tour packages. This analysis can reveal insights such as a growing interest in eco-tourism or a preference for smaller, guided tours. Armed with this information, the company can adjust its offerings to meet these trends, potentially increasing bookings and customer satisfaction. Similarly, ChatGPT can be employed in the creative sectors, such as fashion or digital media, to predict upcoming trends by analyzing current discussions and publications across various platforms. For instance, a digital marketing firm might use ChatGPT to identify emerging themes and sentiments in consumer content, helping to tailor advertising campaigns that resonate more effectively with target audiences. By integrating these AI tools into their operations, businesses in the creative economy and tourism sectors can not only stay ahead of market trends but also tailor their customer interactions and product developments to better meet the changing tastes and expectations of their clientele. This strategic advantage is crucial in industries where success heavily depends on the ability to quickly adapt to consumer preferences and market dynamics.

“ChatGPT and Gemini are vital in leveraging data-driven insights to refine business strategies and adapt to consumer preferences dynamically. These AI technologies analyze vast amounts of data—including consumer trends, feedback, and market conditions—in real-time, enabling businesses to swiftly adjust their offerings and marketing strategies to stay competitive and relevant. By harnessing these insights, businesses can enhance customer experiences, optimize operational efficiencies, and innovate more effectively, ensuring sustained growth and market leadership” (R12, personal communication, May 21, 2024).

“In the creative sectors, such as fashion or digital media, ChatGPT can predict upcoming trends by analyzing current discussions and publications across various platforms. For example, a digital marketing firm might use ChatGPT to identify emerging themes and sentiments in consumer content. This helps the firm tailor its advertising campaigns to resonate more effectively with its target audiences” (R15, personal communication, May 22, 2024).

“For instance, a tourism company might use Gemini to analyze online reviews and social media posts to understand visitor satisfaction and preferences better. Such analysis could uncover a rising interest in eco-tourism or preferences for smaller, guided tours. With this insight, the company can adapt its tour packages to align with these trends, potentially increasing bookings and enhancing customer satisfaction” (R16, personal communication, May 23, 2024).

“By integrating ChatGPT and Gemini into their operations, businesses in the creative economy and tourism sectors can not only stay ahead of market trends but also customize their customer interactions and product developments to better meet the evolving tastes and expectations of their clientele. This strategic advantage is crucial in industries where success heavily depends on the ability to quickly adapt to consumer preferences and market dynamics. The deployment of these AI tools enables businesses to maintain a competitive edge by making informed, data-driven decisions that align closely with market needs" (R19, personal communication, May 24, 2024).

4.3.3.2 Disruptions in Education and Creative Economy and Tourism

The emergence of AI technologies like ChatGPT and Gemini in sectors such as education, and the creative economy and tourism, is causing notable disruptions. In education, AI is changing teaching methods and learning experiences, while in the creative economy and tourism, it's reshaping marketing, customer service, and content creation, affecting job roles and industry practices. These disruptions present challenges but also open doors for innovation and improved efficiency.

(1) Disruptions in Education Sector

In the education sector, the integration of AI technologies highlights significant themes such as a shift in educational roles, concerns over access and equity, and data privacy issues. These themes underscore the need to balance technological advancement with ethical considerations in education, ensuring equitable access, safeguarding student data, and redefining traditional roles within educational environments.

(1.1) Shift in Educational Roles

The advent of AI technologies such as ChatGPT and Gemini is poised to fundamentally alter the landscape of educational roles, shifting the traditional paradigm of teachers as primary knowledge providers to one where they act more as facilitators of learning. This transition reflects a move towards a more guided and personalized learning environment, where AI tools handle the dissemination of information and basic instruction, allowing teachers to focus on enhancing critical thinking skills and addressing individual learning challenges. For example, in a classroom enhanced by ChatGPT, the AI could take over tasks such as delivering lecture content, conducting initial assessments, and providing students with instant feedback. This frees up teachers to engage more deeply with students on one-on-one bases, mentor them on complex problem-solving, and facilitate discussions and group activities that foster a deeper understanding of the material. Similarly, Gemini could be used to analyze student performance data across a variety of metrics to identify trends and learning gaps. Armed with this information, teachers can tailor their instructional strategies to better meet the needs of their students, rather than spending time on routine assessments and grading. However, this shift requires significant retraining for educators. They must become adept at integrating AI tools into their teaching methods and developing new skills focused on interpersonal interactions, mentorship, and the facilitation of student-led learning. Schools and educational institutions will need to provide professional development programs that prepare teachers for these evolving roles, ensuring they are equipped to leverage AI technology effectively while maintaining a high-quality learning environment. This transformation, while disruptive, promises to enhance educational outcomes by creating a more adaptive and personalized learning experience for students.

> "The introduction of AI technologies such as ChatGPT and Gemini is fundamentally changing the educational landscape, transforming teachers from primary knowledge providers to facilitators of learning. This transition enables AI tools to handle basic instruction and information dissemination, freeing teachers to focus on improving critical thinking skills, addressing individual learning challenges, and beyond" (R4, personal communication, May 14, 2024).

> "AI's ability to deliver lecture content, conduct assessments, and provide instant feedback disrupts the conventional teaching approach. This shift challenges educators to adopt new roles focusing more on mentorship and less on direct instruction. AI's role in customizing learning experiences and identifying student needs through data analysis alters the traditional one-size-fits-all educational model. The adaptation process is complex. Educators must develop new skills focused on guiding student-led learning and enhancing critical thinking. This requires ongoing professional development and a significant shift in pedagogical approaches, which can be a challenging

disruption for many teachers accustomed to traditional methods. The need for professional development programs that equip teachers with the skills to effectively integrate AI into their teaching practices is vital. The ability to interpret AI-driven data and use it to support individualized student growth will become a key component of modern education" (R5, personal communication, May 15, 2024).

"This transformation requires significant retraining for educators. They need to become proficient in integrating AI tools into their teaching methods and developing skills focused on interpersonal interactions and mentorship. Educational institutions will need to provide comprehensive professional development programs to prepare teachers for these evolving roles, ensuring they can effectively leverage AI technology while maintaining a high-quality learning environment. Such programs must address both technical competencies and the soft skills required for effective mentoring, fostering not only a supportive but also adaptive educational ecosystem" (R6, personal communication, May 15, 2024).

"There are several concerns. The rapid integration of AI could widen the digital divide, favoring schools with the resources to adopt and integrate these technologies effectively. Additionally, there's the issue of data privacy and the ethical use of AI in educational settings, which adds layers of complexity to its adoption. These disruptions, while promising to enhance learning outcomes, require careful navigation to ensure they benefit all students equitably" (R10, personal communication, May 20, 2024).

(1.2) Access and Equity Concerns

The deployment of advanced AI technologies such as ChatGPT and Gemini in education introduces significant opportunities for enhancing learning experiences. However, it also raises critical concerns regarding access and equity. There is a tangible risk that these technologies could widen the educational divide between students from different socio-economic backgrounds, primarily due to disparities in access to necessary technology. For example, schools in affluent areas might be able to integrate ChatGPT to personalize learning experiences, automate administrative tasks, and provide real-time feedback to students, thereby significantly enriching the educational environment. In contrast, schools in underprivileged areas may struggle with insufficient technological infrastructure, lacking both the hardware and the high-speed internet connectivity required to support such AI tools. This digital divide can lead to a situation where only students with access to these technologies benefit from personalized learning paths and advanced educational tools, while others fall further behind, exacerbating existing educational inequalities. To mitigate these risks, it is crucial for educational policy makers and stakeholders to focus on equitable technology distribution, ensuring all schools have the infrastructure and resources needed to support AI technologies. Additionally, training programs for educators must be accessible across districts to ensure that all teachers can effectively integrate AI into their teaching practices, regardless of their school's location or funding status. Addressing these equity concerns is essential for ensuring that the integration ChatGPT and Gemini contributes positively to all educational sectors, rather than deepening the socio-economic disparities.

> "While AI technologies like ChatGPT and Gemini offer substantial benefits by enhancing learning experiences and operational efficiencies, they also present significant challenges related to equity and access. A primary concern is the potential to widen the educational divide between students from different socio-economic backgrounds. Students with access to advanced technologies and reliable internet connections can benefit more from these AI-driven tools, while those from underprivileged backgrounds may struggle to keep up. This disparity can lead to a significant gap in educational outcomes, exacerbating existing inequalities. Addressing these challenges requires targeted policies and initiatives to ensure that all students, regardless of their socio-economic status, have equal access to the benefits of AI in education" (R2, personal communication, May 12, 2024).

"Schools in affluent areas might have the resources to integrate AI technologies such as ChatGPT, which can personalize learning experiences, automate administrative tasks, and provide real-time feedback. This can significantly enrich the educational environment for these students. However, schools in less privileged areas may struggle due to inadequate technological infrastructure, such as insufficient hardware and lack of high-speed internet, which are crucial for supporting AI tools" (R4, personal communication, May 14, 2024).

"There is a risk that only students with access to advanced AI tools will benefit from personalized learning paths and enhanced educational resources, potentially leading to improved academic performance and better future opportunities. Meanwhile, students without such access might fall further behind, exacerbating existing educational inequalities and limiting their educational and professional prospects" (R7, personal communication, May 15, 2024).

"To address these equity concerns, it is crucial for educational policymakers and stakeholders to focus on equitable technology distribution. Ensuring that all schools, regardless of their socio-economic status, have the necessary infrastructure and resources to support AI technologies is fundamental. Additionally, there should be universally accessible training programs for educators to ensure that all teachers, regardless of their school's location or funding status, can effectively integrate AI into their teaching practices" (R10, personal communication, May 20, 2024).

(1.3) Data Privacy Issues

The widespread adoption of AI tools such as ChatGPT and Gemini in educational settings significantly enhances the learning experience but also introduces serious concerns regarding the security and privacy of student data. These AI technologies process a vast amount of personal and educational information to customize learning experiences and assess student performance, raising potential risks around data misuse, breaches, and unauthorized access. For instance, if a learning management system equipped with ChatGPT is compromised, sensitive information such as student academic records, personal identification details, and behavioral data could be exposed, leading to privacy violations and other serious consequences. To address these concerns, educational institutions must implement robust data protection measures. This includes encrypting data both in transit and at rest, regularly auditing AI systems for vulnerabilities, and adhering to strict access controls. Additionally, there is a need for transparent data governance policies that clarify how student data is collected, used, and shared, ensuring compliance with legal standards such as the Personal Data Protection Act (PDPA). The PDPA mandates the protection of personal data and sets strict guidelines on data consent, collection, processing, and sharing. For example, an educational application using Gemini to track and analyze student performance must ensure that it has obtained explicit consent from the users or their guardians before collecting and processing their data. The institution must also implement robust security measures to protect this data from unauthorized access or breaches, which could include encryption, secure data storage solutions, and regular security audits. Additionally, transparency in how student data is used and shared is crucial. Schools and educational tech providers must clearly inform students and parents about what data is being collected, for what purpose, and who has access to it, ensuring all practices align with PDPA requirements. Moreover, educating all stakeholders—including students, parents, and educators—about data privacy practices and their rights is crucial. This not only fosters a culture of data privacy awareness but also ensures that those involved understand how to protect themselves and what to expect from institutions managing their data. As AI continues to permeate educational environments, balancing innovation with ethical considerations and privacy protections will be key to maintaining trust and security in these transformative tools.

> “The integration of AI technologies such as ChatGPT and Gemini in education, while beneficial for learning enhancement, raises significant security and privacy concerns. These technologies process a vast amount of personal and educational information to personalize learning experiences and assess student

performance, creating potential risks around data misuse and breaches. Safeguarding this data requires robust cybersecurity measures, strict data governance policies, and ongoing vigilance to prevent unauthorized access and ensure that student information remains protected. Educational institutions must prioritize these security and privacy concerns to maintain trust and ensure the safe and effective use of AI technologies" (R1, personal communication, May 12, 2024).

"Imagine a scenario where a learning management system equipped with ChatGPT is compromised. This breach could expose sensitive information such as student academic records, personal identification details, and behavioral data. Such exposure could lead to privacy violations and other serious consequences for the students involved. To mitigate these risks, institutions must implement robust data protection measures. This includes encrypting data both in transit and at rest, conducting regular audits of AI systems for vulnerabilities, and enforcing strict access controls. Moreover, adherence to legal standards like the Personal Data Protection Act, or PDPA, is crucial. The PDPA mandates the protection of personal data and sets strict guidelines on data consent, collection, processing, and sharing" (R2, personal communication, May 12, 2024).

"Transparency is critical. Schools and educational technology providers must clearly inform students and parents about what data is being collected, its purpose, and who has access to it. Ensuring that all data practices align with PDPA requirements helps maintain trust and compliance. Educating stakeholders—including students, parents, and educators—about data privacy practices and their rights is crucial. This education fosters a culture of data privacy awareness and equips everyone involved with the knowledge to protect themselves and understand what to expect from institutions managing their data. Clear communication and education efforts can help mitigate concerns and build a secure and trustworthy educational environment" (R8, personal communication, May 18, 2024).

"As AI continues to permeate educational environments, balancing innovation with ethical considerations and privacy protections is key to maintaining trust and security. This balance involves rigorous adherence to legal standards, robust security practices, and ongoing education of all stakeholders about their data privacy rights and protections. This ethical approach will be fundamental in ensuring that AI tools like ChatGPT and Gemini can be used safely and effectively to enhance educational outcomes" (R10, personal communication, May 20, 2024).

(2) Disruptions in Creative Economy and Tourism Sector

In the creative economy and tourism sector, the integration of AI technologies underscore themes like an altered competitive landscape, job displacement, and dilution of cultural heritage. These themes emphasize the need for a balanced approach to AI adoption, ensuring that advancements enhance the sector while preserving jobs and cultural uniqueness.

(2.1) Altered Competitive Landscape

The incorporation of AI technologies like ChatGPT and Gemini is significantly altering the competitive landscape within the creative economy and tourism sectors, creating opportunities for new market entrants and challenging established businesses to innovate or face displacement. AI-driven solutions offer enhanced data analysis, customer interaction, and service personalization, which can attract customers looking for a more tailored and engaging experience. For instance, a startup in the tourism industry might utilize Gemini to analyze large sets of traveler data to predict emerging travel trends and preferences, allowing them to offer specialized packages before traditional agencies recognize these trends. This preemptive capability could position them favorably against larger, slower-moving competitors.

Furthermore, in the creative industries, companies using ChatGPT can automate and optimize content creation, enabling them to produce more content at a faster pace and at a lower cost. A small advertising firm might deploy ChatGPT to generate creative copy and personalized ad content that resonates better with target demographics, thereby gaining a competitive edge over larger firms that may rely on conventional processes and manual creativity. This ability to rapidly adapt and implement AI not only disrupts traditional business models but also redefines customer expectations, putting additional pressure on all industry players to accelerate their digital transformation. Thus, the shift in market dynamics driven by AI like ChatGPT and Gemini encourages a more competitive environment where speed, innovation, and personalization are key to retaining market share. Companies in the creative and tourism sectors must therefore stay abreast of technological advancements to maintain relevance and competitiveness in an increasingly AI-dominated landscape.

> "The shift driven by AI technologies like ChatGPT and Gemini encourages a more competitive environment where speed, innovation, and personalization are key to retaining market share. Companies must continuously adapt to technological advancements to maintain their relevance and competitiveness in an increasingly AI-dominated landscape" (R13, personal communication, May 21, 2024).

> "Established businesses face the challenge of rapidly integrating AI technologies into their existing processes and operations. This often requires significant investment in new technologies, retraining staff, and potentially overhauling traditional workflows. Failure to do so can result in losing their competitive edge to newer, more agile companies. They need to invest in AI technologies and prioritize continuous innovation. They should also focus on upskilling their workforce to handle new AI-driven tools and processes. Collaborating with startups and tech companies can also help them stay ahead of the curve. Embracing a culture of agility and adaptability is crucial" (R14, personal communication, May 22, 2024).

> "Sectors like digital marketing, content creation, and personalized travel services are particularly affected. In digital marketing, for instance, companies that leverage AI for targeted ad campaigns and consumer insights are gaining a significant advantage. In content creation, AI tools that generate high-quality content quickly are outpacing traditional methods. Similarly, personalized travel services using AI to offer bespoke travel experiences are outperforming standard travel packages" (R19, personal communication, May 24, 2024).

> "The future of competition in these sectors will be heavily influenced by AI technologies. Companies that can swiftly adopt and integrate AI will likely lead the market, while those resistant to change may struggle. Speed, innovation, and personalization will be the driving factors for success. To thrive, all players must stay abreast of technological advancements and continuously adapt to the evolving landscape" (R20, personal communication, May 24, 2024).

(2.2) Job Displacement

The integration of AI technologies like ChatGPT and Gemini in the creative economy and tourism sectors presents significant disruptive potential, particularly in the realm of job displacement. Automation facilitated by these AI tools can streamline or entirely replace tasks that are routine or administrative, potentially leading to job losses. For example, in the tourism industry, roles such as booking agents, travel operators, and information desk staff could be diminished as AI systems like Gemini offer real-time, automated booking services, personalized travel planning, and customer service interactions without human intervention. These systems can handle everything from answering customer inquiries to processing reservations, thereby reducing the need for human staff in these roles. Similarly, in the creative sectors, AI technologies like ChatGPT can automate parts of the content creation process such as writing standard news articles, generating marketing copy, or even composing music tracks, which traditionally required human creatives. This could lead to a reduction in demand for content creators in specific niches, particularly where the creative output is formulaic or highly structured. While these technologies can lead to greater efficiency and cost reduction, they also pose challenges in terms of workforce displacement. Businesses and policymakers must consider these implications seriously, fostering strategies that might include retraining programs to help displaced workers transition into new roles that require more complex and creative skills, ensuring that the workforce can adapt to a rapidly changing job landscape influenced by AI innovations.

> “The integration of AI technologies in these sectors holds significant potential for disruption, especially in terms of job displacement. Automation facilitated by AI can streamline or entirely replace tasks that were traditionally carried out by humans, particularly those that are routine or administrative. In the creative sectors, AI like ChatGPT can automate parts of the content creation process. For example, it can write standard news articles, generate marketing copy, or even compose music tracks. This automation could diminish the demand for content creators in specific niches, particularly where the output is formulaic or highly structured” (R11, personal communication, May 20, 2024).

> “In the tourism industry, roles such as booking agents, travel operators, and information desk staff are particularly vulnerable. AI systems like Gemini can offer automated booking services, personalized travel planning, and customer service interactions without human intervention. These systems can handle tasks ranging from answering customer inquiries to processing reservations, which significantly reduces the need for human staff in these roles” (R16, personal communication, May 23, 2024).

> “While the efficiencies and cost reductions are clear benefits, the broader implications for the workforce are quite challenging. There is a real risk of workforce displacement as tasks that used to require human intervention become automated. Businesses and policymakers need to take these implications seriously. It is crucial to develop strategies that can mitigate these disruptions. This might include retraining programs to help displaced workers transition into new roles that require more complex and creative skills. The aim

is to ensure that the workforce can adapt to the rapidly changing job landscape influenced by AI innovations" (R18, personal communication, May 24, 2024).

"Educational institutions need to revise their curricula to focus more on skills that AI cannot easily replicate, such as critical thinking, creative problem-solving, and interpersonal skills. Preparing the next generation of workers to thrive in an AI-augmented workplace is essential for mitigating the impact of these technological disruptions. The future of work in these sectors will increasingly be shaped by the capabilities of AI technologies. While certain jobs may be displaced, new opportunities will emerge that require more advanced skill sets. The key for both workers and businesses will be adaptability. Embracing continuous learning and skill development will be crucial for thriving in an increasingly AI-integrated job market" (R20, personal communication, May 24, 2024).

(2.3) Dilution of Cultural Heritage

The burgeoning use of AI technologies like ChatGPT and Gemini in the tourism sector, while offering numerous benefits, also raises concerns about the potential dilution of cultural heritage. As these AI tools increasingly participate in creating and modifying cultural content for tourism purposes, there is a risk that the nuanced and deeply rooted aspects of cultural expressions might be oversimplified or inaccurately represented. For instance, an AI-driven virtual tour might use generalized data to reconstruct cultural narratives or traditions, potentially stripping them of their unique local context and depth. This can lead to a homogenized representation of diverse cultures, making them less distinct and potentially less appealing to tourists seeking authentic experiences. Moreover, the use of AI in marketing and promoting tourist destinations often focuses on broad appeal, which might encourage the embellishment or alteration of cultural elements to attract a wider audience. For example, Gemini could analyze global travel trends and suggest adjustments to cultural festival representations to make them more "Instagrammable" or commercially viable, potentially leading to practices that prioritize tourist entertainment over cultural accuracy and respect. This trend could erode the integrity of cultural heritage sites and practices, transforming them into mere attractions rather than places of deep historical and cultural significance. As such, while AI can enhance the efficiency and personalization of tourism services, stakeholders must carefully balance these benefits with the need to preserve and accurately represent the authenticity and richness of local cultures. Ensuring that AI implementations are informed by and engaged with local cultural experts can help mitigate these risks, maintaining the integrity and attractiveness of tourist destinations.

> "The growing use of AI technologies in tourism, while beneficial in many ways, raises significant concerns about the potential dilution of cultural heritage. These AI tools often participate in creating and modifying cultural content for tourism purposes, and there's a risk that they might oversimplify or misrepresent the nuanced and deeply rooted aspects of cultural expressions" (R11, personal communication, May 20, 2024).

> "An AI-driven virtual tour might use generalized data to reconstruct cultural narratives or traditions. This approach can strip these narratives of their unique local context and depth, leading to a homogenized representation of diverse cultures. Tourists seeking authentic experiences might find these representations less distinct and less appealing. AI's role in marketing and promoting tourist destinations often focuses on broad appeal. For instance, Gemini could analyze global travel trends and suggest adjustments to cultural festival representations to make them more "Instagrammable" or commercially viable. This can lead to embellishments or alterations of cultural elements that prioritize tourist entertainment over cultural accuracy and respect" (R15, personal communication, May 22, 2024).

> "Stakeholders must ensure that AI implementations are informed by and engaged with local cultural experts. This collaboration can help maintain the integrity and attractiveness of tourist destinations while leveraging AI for

efficiency and personalization. It is crucial to strike a balance that respects and accurately represents local cultures. Local cultural experts provide invaluable insights and knowledge that AI systems might lack. By involving these experts in the development and deployment of AI technologies, we can ensure that cultural narratives and traditions are represented authentically and respectfully. This approach helps mitigate the risk of cultural dilution and maintains the unique appeal of each destination" (R16, personal communication, May 23, 2024).

"As AI integration in tourism accelerates, the potential for cultural dilution increases. Addressing these concerns is important to preserving the authenticity and richness of cultural heritage. Proactive measures, including the involvement of cultural experts and adherence to ethical AI practices, are essential for safeguarding cultural integrity in the face of technological advancement. We need to implement robust frameworks that prioritize cultural accuracy and respect. This includes engaging local cultural experts, adhering to ethical AI practices, and fostering continuous dialogue between technologists and cultural stakeholders. By taking these steps, we can harness the benefits of AI while preserving the authenticity and richness of cultural heritage, ensuring that tourism remains both innovative and respectful of the cultures it showcases. This approach not only protects cultural heritage but also enhances the tourism experience by providing more accurate and meaningful cultural insights to visitors" (R19, personal communication, May 24, 2024).

In conclusion, the integration of ChatGPT and Gemini in the education, and the creative economy and tourism sectors presents a broad spectrum of opportunities alongside potential disruptions. While these technologies can significantly enhance personalized learning, streamline administrative tasks, and revolutionize customer experiences, they also pose challenges such as job displacement, ethical concerns, and the potential dilution of cultural heritage. Balancing these opportunities and challenges is crucial for harnessing AI's potential to positively transform these sectors while mitigating adverse impacts.

4.4 Economic Impact and Career Development with ChatGPT and Gemini

Utilizing a qualitative approach, this section explores the nuanced dimensions of economic impact and career development related to ChatGPT and Gemini. It provides in-depth insights into user experiences and perceptions, examining how these technologies influence economic opportunities and career advancement. The integration of ChatGPT and Gemini into the education, creative economy, and tourism sectors is markedly transforming their economic landscapes and career development prospects. The incorporation of these advanced tools is enhancing operational efficiencies within these sectors while simultaneously uncovering new opportunities for revenue generation, competitive differentiation, and professional advancement.

Figure 4.4 visually represents the outcomes as a word cloud of key terms from the interviews on economic impact and career development with ChatGPT and Gemini, highlighting the most frequently used words. This visualization, produced using a word frequency query in NVivo, enhances the clarity of the results.

Figure 4.4 Word Cloud on Economic and Career Implications
with ChatGPT and Gemini
Source: Researcher

As presented in Figure 4.4, this word cloud visualization provides insight into the economic impact and career development implications of AI technologies, particularly ChatGPT and Gemini, in the context of education and tourism sectors. The prominence of “AI,” “educational,” and “learning” at the center suggests a focus on how these technologies are reshaping educational paradigms and learning processes. The presence of terms like “professionals,” “skills,” and “enhance” indicates a significant emphasis on career development and the upskilling of the workforce through AI integration. The inclusion of “tourism” and “customer” points to the application of AI in the service sector, potentially revolutionizing customer experiences and business operations. Words such as “data,” “analyze,” and “driven” highlight the data-centric nature of AI applications, suggesting new analytical capabilities that could drive economic growth and inform decision-making processes. The term “personalized” implies a trend towards tailored services and learning experiences, which could create new economic opportunities and career paths. “Technology” and “innovation” underscore the transformative potential of AI in various sectors, while “creative” suggests the emergence of new roles that blend technological proficiency with creative skills. The presence of “institutions” and “sector” indicates a broad, systemic impact of AI across different organizational levels and industries. Overall, this visualization encapsulates the multifaceted influence of AI on economic structures and career landscapes, emphasizing the need for adaptive learning and skill development in an AI-driven economy.

Figure 4.5 visually represents the outcomes as a tree map of key terms from the interviews on economic impact and career development with ChatGPT and Gemini.

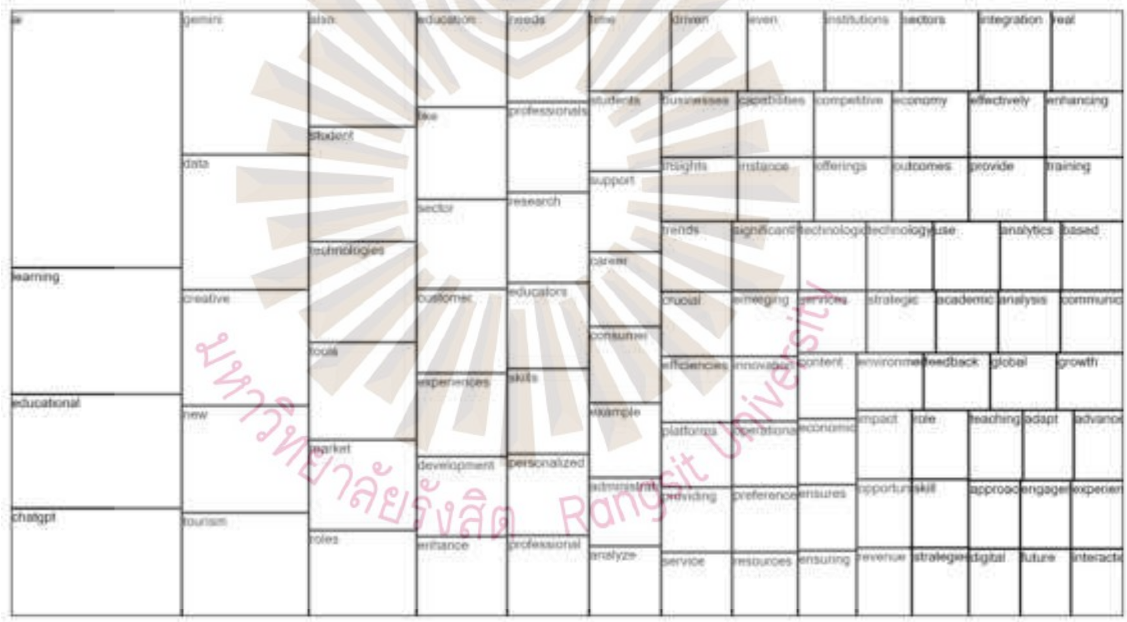

Figure 4.5 Tree Map on Economic and Career Implications with ChatGPT and Gemini

Source: Researcher

According to Figure 4.5, this tree map visualization offers a comprehensive overview of the economic impact and career development implications of AI technologies, specifically ChatGPT and Gemini, across various sectors. The prominence of terms such as “learning,” “educational,” and “chatGPT” underscores the significant role these AI tools play in reshaping educational paradigms and learning processes. The inclusion of “tourism” alongside these educational terms suggests a dual focus on both the education and tourism sectors as key areas of AI application and impact. The map highlights the multifaceted nature of AI's influence through terms like “data,” “creative,” and “new,” indicating the diverse ways in which these technologies are transforming traditional practices. The presence of “professional,” “skills,” and “development” points to the critical role of AI in career advancement and the evolving job market. Terms such as “customer,” “market,” and “experiences” suggest a shift towards more personalized and efficient service delivery in various industries. Economic implications are evident through words like “economy,” “revenue,” and “growth,” highlighting the potential for AI to drive economic development. The inclusion of “strategies,” “analytics,” and “insights” indicates the importance of data-driven decision-making in this new landscape. Furthermore, terms such as “integration,” “adapt,” and “future” emphasize the need for ongoing adaptation to technological advancements. Overall, this tree map effectively captures the complex interplay between AI technologies, educational transformation, economic growth, and career evolution, suggesting a future where AI tools like ChatGPT and Gemini play a central role in shaping both individual career trajectories and broader economic trends.

Figure 4.6 visually represents the outcomes as a word tree, using text search query via NVivo software, from the interviews on economic impact and career development with ChatGPT and Gemini.

Figure 4.6 Word Tree on Economic and Career Implications with ChatGPT and Gemini

Source: Researcher

As illustrated in Figure 4.6, this word tree visualization provides a comprehensive overview of the economic impact and career development implications of ChatGPT and Gemini across various sectors, particularly in education and the creative industries. The central nodes “ChatGPT” and “Gemini” branch out to illustrate the multifaceted applications and effects of these AI technologies. In the realm of economic impact, the tree highlights how these tools are transforming operational efficiencies and data analysis capabilities. Phrases such as “enhance our operational efficiencies,” “process vast datasets quickly,” and “analyze historical data” underscore the potential for significant productivity gains across industries. The mention of “Resource Optimization AI technologies” and “dramatically elevate consumer spending” points to both cost-saving and revenue-generating potentials. Regarding career development, the visualization emphasizes the transformative nature of these technologies. The phrase “reshaping career landscapes across” suggests a fundamental shift in job markets and required skill sets. The tree indicates that professionals are increasingly expected to understand and utilize AI tools like ChatGPT and Gemini, as evidenced by phrases such as “where professionals use” and “understanding how to use technologies like ChatGPT and Gemini.” In the education sector, the tree illustrates how these AI tools are being integrated into educational systems, offering personalized academic support and enhancing student engagement. The phrase “propel educational institutions to” suggests that these technologies are driving innovation in teaching methodologies and institutional practices. For the creative and tourism sectors, the visualization indicates that AI is being leveraged for trend forecasting, customer engagement, and personalized experiences. Phrases like “customization greatly improves visitor engagement” and “tourism trend forecasting could leverage” highlight the economic potential in these industries. Overall, this word tree effectively captures the wide-ranging economic impacts of ChatGPT and Gemini, from driving operational efficiencies and data-driven decision-making to reshaping career paths and necessitating new skill development across various professional domains. It underscores the transformative potential of these technologies in creating new economic opportunities while also highlighting the need for adaptation in the workforce.

4.4.1 Economic Impact in Education and Creative Economy and Tourism

In the rapidly evolving landscape of AI, sectors as diverse as education and the creative economy and tourism are undergoing significant transformations due to the integration of these technologies. Each sector, distinct in its dynamics and challenges, shares a common trajectory of technological empowerment that highlights specific thematic concerns. The following sections delineate the themes pertinent to each sector.

(1) Economic Impact in Education Sector

In the education sector, the primary themes identified are resource optimization, revenue opportunities, and competitive advantage. These themes highlight the sector's focus on enhancing operational efficiencies, generating new streams of income, and achieving a competitive edge through ChatGPT and Gemini.

(1.1) Resource Optimization

AI technologies are revolutionizing administrative efficiencies in the education sector, leading to significant cost reductions and more strategic use of resources. For instance, the implementation of Gemini can transform attendance management by automatically monitoring student logins and participation in digital platforms. This system ensures precise and effortless attendance tracking, minimizing manual errors and administrative workload. Additionally, ChatGPT can substantially enhance communication by handling routine inquiries from students and parents. This AI-driven approach can respond to questions about course schedules, examination details, and administrative procedures around the clock, providing timely and accurate information. By automating these tasks, educational institutions can redirect their human and financial resources towards enhancing teaching quality, expanding student support services, and upgrading technological infrastructure, thereby optimizing educational outcomes.

> “ChatGPT has been a game changer in how we handle inquiries. It interacts with students and parents, providing them with immediate answers to questions

about course schedules, exam details, and other administrative procedures. It operates around the clock, which means our community gets timely and accurate information whenever they need it” (R4, personal communication, May 14, 2024).

“The introduction of Gemini has been transformative for us, especially in handling attendance. By automatically monitoring student logins and participation on our digital platforms, Gemini ensures accurate attendance records. This automation significantly reduces the time our staff spent on manual tracking and correcting errors. This shift has positively impacted my administrative staff. Our administrative staff can now focus more on strategic tasks rather than mundane data entry. For example, they are working more closely with teachers to identify students who might need additional support based on their engagement levels tracked through Gemini” (R5, personal communication, May 15, 2024).

“The savings in time and manpower have been substantial. We have redirected these resources towards enhancing the quality of our teaching, expanding student support services, and upgrading our technological infrastructure. For example, we are now able to offer more personalized support to students and invest in better educational tools, which directly optimizes educational outcomes. This allows for a more focused and effective educational environment, improving both student satisfaction and academic performance” (R6, personal communication, May 15, 2024).

“One significant improvement has been the expansion of our tutoring and counseling services. Previously, funds and staff time were too stretched to support these adequately. Now, with administrative efficiencies gained through AI, we have been able to double the availability of these critical services, directly benefiting our students' educational experiences and wellbeing” (R7, personal communication, May 15, 2024).

(1.2) Revenue Opportunities

The integration of AI technologies like ChatGPT and Gemini offers educational institutions the opportunity to innovate and diversify their course offerings, thereby attracting a wider student demographic and opening new revenue channels. ChatGPT can be utilized to create interactive and adaptive learning platforms that dynamically adjust content and tutoring based on real-time student interactions. This personalized approach makes learning more engaging and directly tailored to individual educational needs. On the other hand, Gemini's data analytics capabilities can provide deep insights into learning patterns and preferences, enabling the development of highly customized learning modules. These modules can cater to specific educational objectives and learning styles, increasing student enrollment and satisfaction. Such personalized and data-driven educational products not only enhance the learning experience but also position institutions as leaders in educational innovation, appealing to both domestic and international students seeking state-of-the-art educational environments.

> "ChatGPT and Gemini have been instrumental in diversifying and personalizing our educational content. ChatGPT, in particular, has enabled us to develop interactive and adaptive learning platforms. These platforms adjust the content dynamically based on real-time interactions with students, which provides a highly personalized learning experience. For instance, if a student is struggling with a specific concept in mathematics, ChatGPT detects this through their responses and interaction patterns. It then adjusts the difficulty level of the problems or provides additional resources tailored to the student's needs. This aids in comprehension and keeps the student engaged" (R1, personal communication, May 12, 2024).

> "Gemini's role is more on the analytical side. It gathers data on student learning patterns and preferences, which we use to develop highly customized learning modules. These modules are designed to cater to various educational objectives and learning styles, thus enhancing our ability to meet diverse student needs

effectively. This data-driven approach ensures that educational content is tailored to optimize individual learning experiences, improving student engagement and academic outcomes" (R4, personal communication, May 14, 2024).

"This has significantly affected student enrollment and satisfaction. Our ability to offer tailored learning experiences has attracted a broader demographic of students, including international students who are looking for cutting-edge educational tools and methodologies. We have seen an increase in enrollment and, more importantly, student satisfaction scores have improved as they feel more supported and understood in their learning journey" (R5, personal communication, May 15, 2024).

"I believe we are just beginning to see the potential of AI in education. Future developments could include even more sophisticated data analytics for understanding and predicting student success, and further advancements in adaptive learning technologies. This will not only enhance individual learning experiences but also empower educational institutions to innovate continually and maintain competitiveness in a global market. They are transforming how we teach and learn, making education more accessible, engaging, and effective. This positions us as leaders in educational innovation, which is critical for attracting the next generation of learners" (R10, personal communication, May 20, 2024).

(1.3) Competitive Advantage

Integrating AI technologies like ChatGPT and Gemini can propel educational institutions to the forefront of academic excellence, offering them a competitive advantage in the global education market. These AI tools enable the development of superior educational programs that can adapt to the needs of a diverse student population. For example, ChatGPT can assist in the creation of interactive and adaptive courses that respond in real-time to student queries and provide personalized academic support. Gemini, with its robust data processing abilities, can analyze educational outcomes across different demographics and course structures, offering insights that help institutions refine their educational strategies and offerings. Such capabilities not only lead to enhanced educational outcomes but also attract a wider range of international students, thereby improving institutional rankings and reputation on a global scale. Through these innovations, institutions not only offer improved education but also position themselves as leaders in the adoption of AI in academia.

> "AI tools such as ChatGPT and Gemini are crucial in maintaining our position at the forefront of academic excellence. They enable the development of educational programs that are not only comprehensive but also highly adaptive to the needs of a diverse student body. Specifically, ChatGPT has been integrated into several of our interactive courses to provide real-time academic support. It responds to student inquiries instantly, tailoring explanations and resources to their individual learning pace and style. This capability enhances student engagement and understanding, particularly in complex subjects. Meanwhile, Gemini excels in data processing, analyzing educational outcomes across various demographics and course structures. This analysis provides detailed insights essential for continuously refining our course offerings and teaching methodologies to better serve our students" (R1, personal communication, May 12, 2024).

> "The impacts have been profoundly positive on my institutional rankings and reputation. By enhancing our educational outcomes and providing tailored learning experiences, we've seen an uptick in our global rankings. Moreover, these advancements have attracted a more significant number of international students, further diversifying our student population and enriching the learning environment. This diversification not only broadens perspectives within the institution but also strengthens our global network and cultural exchange, creating a more vibrant and inclusive academic community" (R2, personal communication, May 12, 2024).

"By leveraging AI to reduce costs and enhance service quality, we enhance our appeal to potential students globally. This not only helps in increasing enrollment but also in retaining students by offering them a superior educational experience. Furthermore, these efficiencies make us more adaptable to market changes, ensuring long-term sustainability" (R5, personal communication, May 14, 2024).

"In terms of future prospects, I envision AI becoming even more integrated into our academic and administrative processes. We are exploring AI-driven predictive models to enhance student success and retention rates. Additionally, we are looking to expand AI functionalities to facilitate a more collaborative and interactive learning environment that transcends traditional classroom boundaries. I would emphasize that the future of education relies heavily on technology and innovation. Institutions that embrace AI and leverage its capabilities will not only enhance their educational offerings but also position themselves as leaders in the evolution of global academia. It is a strategic imperative, not just a technological upgrade" (R6, personal communication, May 15, 2024).

(2) Economic Impact in Creative Economy and Tourism Sector

In the creative economy and tourism sector, the emphasis shifts to enhanced consumer spending, operational efficiencies, and market expansion. Here, AI's role in personalizing consumer experiences, streamlining operations, and penetrating new markets demonstrates its pivotal impact on reshaping industry practices and consumer interactions. These themes collectively underscore the profound and varied influence of AI across different sectors, illustrating its role as a catalyst for innovation and growth.

(2.1) Enhanced Consumer Spending

In the tourism and creative industries, integrating AI technologies like ChatGPT and Google's Gemini can dramatically elevate consumer spending by tailoring experiences to individual preferences and improving overall customer satisfaction. For instance, ChatGPT can be deployed in customer service to provide real-time, personalized assistance, suggesting activities and experiences uniquely suited to each visitor's interests. This could range from recommending a quiet beach getaway for a couple seeking solitude to suggesting a vibrant cultural festival for a family looking for an immersive experience. Similarly, Gemini can leverage its advanced analytics capabilities to optimize recommendation systems further. By analyzing detailed consumer behavior data and preferences collected over time, Gemini can enable businesses to offer hyper-personalized promotions and service packages. These targeted offerings not only meet the exact needs and desires of consumers but also encourage longer stays and increased spending on accommodations, dining, and activities, significantly boosting revenue for local businesses.

> “AI technologies are transforming our interactions and services for tourists. ChatGPT, for instance, offers real-time, tailored assistance in our customer service, recommending activities and locations based on specific user preferences to boost visitor satisfaction. For example, it can direct a couple to the most serene beaches and exclusive accommodations, or guide a family to vibrant local festivals and child-friendly venues. Such customization greatly improves visitor engagement. Gemini plays a vital role by enhancing our consumer behavior analysis with its advanced analytics. It processes data on visitor preferences to create highly personalized marketing campaigns and promotions, increasing their attractiveness and effectiveness. This leads to longer visits and greater expenditure, boosting overall revenue” (R12, personal communication, May 21, 2024).

> “The impact of these AI-driven personalized experiences is substantial. By aligning our offerings more closely with visitor desires, we have seen a significant increase in overall spending. Visitors stay longer and spend more on accommodations, dining, and activities. This not only boosts direct revenue for local businesses but also strengthens the overall economic health of our region. I would say that the increased spending contributes to job creation,

infrastructure development, enhanced community services, and more, fostering a thriving and sustainable local economy" (R14, personal communication, May 22, 2024).

"AI is becoming an integral part of our strategic planning in tourism. Its ability to process and analyze large volumes of data in real time allows us to stay ahead of market trends and continuously improve our service offerings. Looking forward, I anticipate even more sophisticated AI applications that will further enhance visitor experiences and operational efficiencies" (R17, personal communication, May 23, 2024).

"Looking at the bigger picture, AI-driven growth in tourism acts as a catalyst for broader regional development. Improved tourism revenues can fund infrastructure improvements, such as better roads and public services, which in turn attract more visitors and even investors. This creates a positive feedback loop that benefits not just tourism but the region as a whole. In the long term, I see a sustained increase in both the quality and quantity of tourism, driving broader economic growth. As AI technologies evolve, they will enable even more precise personalization and efficiency, further boosting tourism and related sectors. This could elevate the global competitiveness of regions that effectively integrate these technologies" (R19, personal communication, May 24, 2024).

(2.2) Operational Efficiencies

AI technology significantly enhances operational efficiencies across the creative and tourism sectors by optimizing various backend and customer-facing processes. In the creative sector, for example, Gemini can analyze historical data from supply chains to predict future needs, thereby helping businesses manage inventory more effectively and reduce waste. This predictive capability ensures that resources are used efficiently, leading to cost savings and sustainability in operations. In the tourism industry, ChatGPT can be utilized for predictive maintenance of infrastructure such as hotels, transportation networks, and tourist attractions. By processing data from maintenance logs and sensor outputs, ChatGPT can forecast potential system failures before they occur, allowing for timely interventions that prevent disruptions and maintain high service quality. This proactive maintenance not only saves on costly repairs but also ensures that tourists have a seamless and enjoyable experience, reflecting positively on the service provider's brand.

> "AI has been pivotal in streamlining both backend and customer-facing processes. In the creative sector, for instance, Gemini's ability to analyze historical data from supply chains is a game-changer. It predicts future needs, allowing businesses to manage inventory more effectively and minimize waste. By accurately forecasting inventory needs, we avoid overproduction and excess stock, which reduces storage costs and waste. This not only saves money but also aligns with our sustainability goals by conserving resources and reducing our environmental footprint" (R14, personal communication, May 22, 2024).

> "The operational efficiencies gained through AI have a ripple effect on the broader economy. For example, in the creative sector, effective inventory management through AI like Gemini not only reduces operational costs but also enhances the agility of businesses. This means companies can respond more swiftly to market trends and demands, leading to higher revenue and market share. They are quite substantial. Efficient operations lead to lower costs and better resource allocation, which ultimately enhances profitability. Moreover, these savings can be reinvested into other areas such as R&D or expanding into new markets, fostering growth and innovation" (R18, personal communication, May 24, 2024).

> "In the tourism sector, ChatGPT is instrumental in our maintenance strategies, especially for infrastructure like hotels and transportation networks. It analyzes maintenance logs and sensor outputs to predict potential system failures before

they happen. The primary benefit of this predictive maintenance is cost savings. Preventing a failure before it occurs is far cheaper than dealing with its aftermath. This proactive approach ensures that our services remain uninterrupted, which is crucial for maintaining high quality and ensuring that tourists have a seamless experience. They significantly enhance our brand reputation. When tourists experience efficient, seamless service, it reflects positively on us. Moreover, demonstrating that we use advanced technologies to enhance guest experiences positions us as forward-thinking and reliable operators in the market" (R19, personal communication, May 24, 2024).

"ChatGPT and Gemini enhance our operational efficiencies. AI's role is only going to grow. We anticipate more sophisticated AI tools that can integrate broader datasets and offer even more accurate predictions and operational insights. This will further optimize resource use, enhance service delivery, and drive down costs, which is crucial for staying competitive in these sectors. We are excited about the possibilities AI offers and are committed to leveraging its potential to improve both our operations and customer experiences" (R20, personal communication, May 24, 2024).

(2.3) Market Expansion

AI tools like ChatGPT and Gemini provide invaluable insights that help businesses in tourism and creative industries identify and penetrate new markets. ChatGPT can enhance market expansion strategies by engaging directly with potential customers in diverse geographical regions through social media and other digital platforms, providing personalized interactions and gauging interest in new offerings. Meanwhile, Gemini's data analysis capabilities allow businesses to dissect extensive data sets, including global economic trends, consumer spending patterns, and social media sentiments, to pinpoint emerging markets and demographic shifts that present new opportunities. For example, a tourism company might use ChatGPT to conduct virtual question and answer (Q&A) sessions to explore interest levels in new travel destinations or types of vacation packages, while Gemini analyzes the data collected to refine the offerings based on real-time feedback. This dual approach ensures that businesses can adapt their marketing strategies dynamically, effectively capturing new segments and expanding their customer base. By combining ChatGPT's engagement capabilities with Gemini's analytical prowess, companies can execute targeted and informed market expansion strategies that capitalize on emerging opportunities while staying aligned with consumer trends and preferences.

> "ChatGPT has been instrumental in allowing us to conduct virtual interactions with potential customers across different regions. For instance, we use the AI tool, ChatGPT, to host question and answer sessions on social media where we introduce new travel destinations or vacation packages. These sessions are tailored to gauge interest and gather feedback directly from the target demographic. These interactions provide a wealth of qualitative data. In addition, we analyze questions, concerns, and suggestions from potential customers, which helps us understand exactly what the market is looking for. This direct feedback loop allows us to quickly adjust our offerings to better match customer expectations and needs" (R11, personal communication, May 20, 2024).

> "Gemini plays a crucial role by analyzing extensive datasets that include global economic trends, consumer spending patterns, and even social media sentiments. This analysis helps us identify not just emerging markets, but also specific demographic shifts and preferences within these markets. For example, if Gemini identifies a growing interest in eco-tourism among European travelers, we use that insight to develop targeted marketing campaigns and travel packages that cater to this interest. Gemini's analytics help us refine these offerings continuously based on the latest data, ensuring our marketing efforts are highly targeted and effective" (R13, personal communication, May 21, 2024).

"The impact has been transformative. By effectively identifying and engaging with new market segments, we have significantly expanded our customer base. This not only drives revenue growth but also strengthens our brand presence in competitive and new markets. To ensure these strategies remain effective in the face of changing market dynamics, we maintain a cycle of continuous feedback and refinement. ChatGPT and Gemini provide ongoing insights that allow us to adapt quickly to changes in consumer behavior or market conditions. This agility is crucial for staying relevant and competitive" (R16, personal communication, May 23, 2024).

"Looking forward, as we scale, data privacy and managing cross-cultural communication nuances become increasingly complex. Ensuring compliance with international data protection regulations and effectively localizing communication are key challenges we are actively addressing. I anticipate advancements in AI will lead to even more sophisticated predictive analytics, enabling us to foresee market trends and consumer needs with greater accuracy. Improvements in NLP could also enhance our ability to engage with diverse global audiences in more meaningful and culturally resonant ways" (R19, personal communication, May 24, 2024).

4.4.2 Career Development in Education and Creative Economy and Tourism

The integration of advanced AI technologies such as ChatGPT and Gemini is reshaping career landscapes across various sectors, including education and the creative economy and tourism. This transformation is particularly pronounced in the fields of education and the creative economy and tourism, where AI's influence extends beyond operational efficiency to fundamentally alter the nature of work and required competencies.

(1) Career Development in Education Sector

The education sector is experiencing a paradigm shift as AI technologies streamline administrative processes and open new avenues for pedagogical innovation. This shift is not merely about replacing traditional roles but enriching the professional landscape through the creation of new opportunities and the enhancement of educational practices. The primary themes identified in this transformation include emerging roles and career flexibility, skill enhancement, and research and collaboration.

(1.1) Emerging Roles and Career Flexibility

The adoption of AI technologies in education is catalyzing the creation of new roles that focus on technology integration, AI maintenance, and the development of personalized learning curricula. As routine administrative and educational tasks are increasingly handled by AI systems like ChatGPT, educators and administrative staff are afforded the opportunity to shift their focus towards more strategic and creative endeavors. For example, educational technologists or AI integration specialists may emerge as key roles responsible for tailoring AI tools like ChatGPT to specific educational needs and maintaining these systems to ensure their optimal performance. Furthermore, AI enables educators to explore more flexible and diverse teaching methodologies. Personalized learning experts, for instance, could work closely with AI systems like Gemini to analyze student data and customize learning experiences, thus leading to more dynamic and engaging educational environments. This shift not only enriches the professional landscape but also offers educators more varied and satisfying career paths.

> “The integration of AI like ChatGPT and Gemini into our educational systems is indeed transformative, creating numerous opportunities for both existing and emerging roles. It allows educators and administrative staff to move away from routine tasks and focus on areas that require more strategic thinking and creativity. One significant role is that of an educational technologist or AI integration specialist. These professionals are responsible for tailoring AI tools to meet specific educational needs and maintaining these systems to ensure

they perform optimally. Interviewee: These roles allow for a more targeted approach to education. For instance, AI integration specialists ensure that AI tools are effectively incorporated into the curriculum, enhancing both teaching and learning experiences" (R4, personal communication, May 14, 2024).

"This shift is profoundly enriching the professional landscape for educators. By reducing the burden of administrative and routine educational tasks, AI allows educators to explore more strategic and creative roles. This not only makes their careers more varied and interesting but also more satisfying as they can see a direct impact on student engagement and performance" (R5, personal communication, May 15, 2024).

"Career flexibility allows institutions to better adapt to changes in educational technology and pedagogy. It fosters a more dynamic and innovative environment where staff can take on new challenges and continuously develop their skills. This adaptability is crucial for institutions to remain competitive and responsive to the evolving educational landscape" (R6, personal communication, May 15, 2024).

"A main challenge is ensuring that all staff are sufficiently trained and comfortable with AI technologies. To address this, we are ramping up our professional development programs and providing ongoing training in AI integration and maintenance. Ensuring that our educators are proficient in using these tools and in innovating with them is key to our strategy" (R7, personal communication, May 15, 2024).

(1.2) Skill Enhancement

With the integration of AI in educational settings, there is a growing demand for educators to develop new skills centered around AI utilization, digital literacy, and data management. To stay relevant and effective in their roles, educators must become proficient in operating AI tools such as ChatGPT for instructional purposes and Gemini for data analysis. For instance, teachers could receive training on how to implement ChatGPT in the classroom as a tool for enhancing student engagement through interactive learning sessions or for providing personalized feedback on assignments. Similarly, understanding how to use Gemini to analyze educational outcomes and tailor teaching strategies could become an essential skill for educators. This requirement for continuous professional development in the use of AI technologies encourages a culture of lifelong learning among educators, ensuring that they remain at the cutting edge of educational innovation.

> "We provide specialized training sessions for educators on how to integrate ChatGPT into the classroom. This includes using it to conduct interactive learning sessions that engage students more dynamically and providing personalized feedback on student assignments using AI insights. With Gemini, the focus is on training educators to analyze educational outcomes. They learn how to interpret data collected from student interactions and assessments to tailor their teaching strategies more precisely to the needs of their students. Understanding data analytics is becoming crucial for educators to enhance learning outcomes effectively. This requirement for continuous skill enhancement fosters a culture of lifelong learning among educators. It encourages them to continually update their capabilities and stay relevant in their roles, ensuring they remain at the forefront of educational innovation" (R4, personal communication, May 14, 2024).

> "One of our teachers, after receiving training on ChatGPT, began using it to create customized learning scenarios based on each student's progress and interests. This not only increased student engagement but also allowed the teacher to manage classroom activities more efficiently, providing more time for one-on-one instruction where needed" (R5, personal communication, May 15, 2024).

“We support our educators by not only providing the necessary training but also by offering ongoing support and resources. This includes access to online courses, workshops, and peer learning groups where they can share experiences and strategies for integrating AI into their teaching” (R6, personal communication, May 15, 2024).

“One of the main challenges is the initial resistance to adopting new technologies. To address this, we emphasize the practical benefits and improvements in teaching and learning outcomes through AI integration. We also provide robust technical support to ensure educators feel confident and supported as they navigate these new tools. Well, as AI technologies evolve, we anticipate that educators will need to develop more advanced skills in AI programming and even machine learning principles to tailor AI tools more closely to educational needs. Additionally, ethical considerations in using AI will become an increasingly critical area of competency” (R10, personal communication, May 20, 2024).

(1.3) Research and Collaboration

AI technologies are significantly enhancing research capabilities and collaborative opportunities in education. Advanced data analysis platforms can process large datasets to uncover insights that drive academic research, while AI platforms such as ChatGPT can assist in drafting research proposals, papers, and even generating new research questions based on the latest data trends. Gemini can be used for generative tasks, assisting researchers in areas like creating new hypotheses, suggesting research directions, or even developing novel materials or concepts. Moreover, AI facilitates seamless communication and data sharing among institutions, enabling a more collaborative research environment. For example, an AI-driven platform could allow researchers from different geographical locations to work together in real-time, sharing data, resources, and findings effortlessly. This not only accelerates the pace of research but also broadens the scope, allowing for more comprehensive studies that can have a greater impact on educational practices and policies.

“AI is revolutionizing the way we approach research and collaboration in education. Advanced data analysis platforms like Gemini can process vast datasets quickly, uncovering insights that are crucial for driving academic research forward. Additionally, AI tools like ChatGPT assist researchers by automating the drafting of research proposals and papers, and even generating innovative research questions based on emerging data trends” (R1, personal communication, May 12, 2024).

“We recently had a project where Gemini was used to analyze educational outcomes across different learning models. The platform helped identify patterns and trends that were not initially apparent, leading to new hypotheses about personalized learning. ChatGPT, on the other hand, assisted the research team in drafting the initial research proposal and subsequent papers, significantly speeding up the publication process” (R3, personal communication, interviewed on May 14, 2024).

“AI-driven platforms enable seamless communication and data sharing among institutions, regardless of geographical location. In ChatGPT, there is a ‘Add Team Workspace’ function where you can collaborate with your peers. For example, researchers can collaborate in real-time, sharing data, resources, and findings through a centralized AI platform. This not only accelerates the research process but also allows for more diverse input and perspectives, enhancing the quality and scope of research” (R8, personal communication, May 18, 2024).

“The implications are profound. With faster and more comprehensive research capabilities, we can quickly translate findings into practice and policy changes that have a real impact on educational systems. For instance, insights gained from AI-driven research can lead to more effective teaching strategies, better student engagement techniques, and more informed policy decisions that can significantly improve educational outcomes” (R9, personal communication, May 18, 2024).

(2) Career Development in Creative Economy and Tourism Sector

In the creative economy and tourism, AI is not only optimizing existing processes but also creating new spaces for innovation and interaction between technology and creativity, profoundly impacting career development in these fields. The primary themes identified are skill transformation, new creative and technical roles, and adaptability and lifelong learning.

(2.1) Skill Transformation

In the evolving landscape of the creative and tourism sectors, the integration of digital and AI skills with traditional creative and hospitality expertise is becoming increasingly critical. This fusion of capabilities is essential for professionals aiming to thrive in a digitally-driven market. For example, a hospitality professional might use AI tools like ChatGPT to enhance guest services through personalized communication and automated customer support. Similarly, artists in the creative sector could employ Gemini to analyze market trends and consumer preferences, tailoring their artistic productions to meet current demands. This skill transformation not only broadens the professional capabilities of individuals in these sectors but also enhances their career prospects by aligning their skills with the technological advancements and expectations of today's market.

“In the hospitality sector, for instance, professionals are using AI tools like ChatGPT to enhance guest services. This includes everything from automated customer support to personalized communication that anticipates guest needs based on previous interactions. Similarly, in the creative sector, artists and designers are utilizing tools like Gemini to analyze market trends and consumer preferences, allowing them to tailor their productions more closely to current market demands. These AI-driven insights enable professionals to deliver more relevant and engaging experiences, ultimately boosting satisfaction and loyalty among customers and audiences" (R12, personal communication, May 21, 2024).

"The landscape of both creative and tourism industries is evolving rapidly, with digital and AI skills becoming increasingly crucial. Professionals in these fields are now expected to blend traditional expertise with new technological capabilities to stay competitive in a digitally-driven market" (R13, personal communication, May 21, 2024).

"The transformation significantly broadens the skill set of individuals in these sectors. By integrating AI and digital skills, they can perform a wider range of tasks more efficiently and creatively. For example, a hotel manager who can analyze guest data to improve service offerings is more valuable than one who cannot. Similarly, a graphic designer who uses AI to predict visual trends has a competitive edge over those who do not" (R14, personal communication, May 22, 2024).

"The skills are dramatically enhancing career prospects by aligning professionals with the technological advancements and market expectations of today's industries. Professionals who adapt and upskill in these areas are more likely to advance in their careers, secure higher-paying jobs, and remain relevant in their fields. Many organizations are offering training programs and workshops specifically designed to integrate digital and AI skills into the professional toolkits of their employees. There are increasing collaborations with tech companies and educational institutions to provide hands-on learning experiences and certifications in AI and digital technologies" (R20, personal communication, May 24, 2024).

(2.2) New Creative and Technical Roles

The adoption of AI is catalyzing the creation of new roles within the creative and tourism sectors that blend technical expertise with creative execution. AI-driven content creation, for instance, involves the use of tools like ChatGPT to generate innovative marketing content, scripts, or interactive customer experiences. Meanwhile, data analytics for tourism trend forecasting could leverage Gemini to provide insights that help businesses anticipate market changes and visitor preferences, enabling more strategic planning and marketing. Additionally, AI system management roles are emerging to oversee the integration and maintenance of these technologies, ensuring they are used efficiently and effectively. These roles not only provide new professional growth avenues but also require a unique combination of technical knowledge and creative insight.

> "AI is transforming the job landscape in these industries by blending technical expertise with creative execution. We are seeing the emergence of roles that require a unique combination of skills, particularly where AI-driven content creation and data analytics intersect with traditional industry functions" (R11, personal communication, May 20, 2024).

> "These roles require a hybrid skill set. Technical skills are crucial, particularly in AI operation and data analysis. However, creative insight is also essential, as the output needs to resonate on a human level and engage customers effectively. For example, an AI-driven content creator needs to understand both the capabilities of AI tools and the elements of compelling storytelling. These roles are opening new avenues for professional growth. They allow individuals to engage with cutting-edge technology while applying their creative and strategic insights, offering pathways to advanced positions in management and strategy formulation. Essentially, they bridge the gap between traditional roles and future technological needs" (R15, personal communication, May 22, 2024).

> "In the creative sector, one of the new roles is that of an AI-driven content creator. This role involves using tools like ChatGPT to generate innovative marketing content, scripts, or even entire narratives for interactive customer

experiences. Similarly, in the tourism sector, we have roles focused on data analytics, where professionals use tools like Gemini to forecast trends and analyze visitor data, helping businesses anticipate market changes and tailor their offerings accordingly. These emerging roles highlight the increasing importance of AI in driving creativity and strategic decision-making" (R16, personal communication, May 23, 2024).

"Many organizations are now partnering with institutions and technology providers to offer specialized training programs. These programs are designed to upskill employees in both AI technology and creative applications. Internal mentorship and ongoing learning initiatives are common, ensuring that employees not only acquire these skills but continue to evolve as the technology advances. As AI technologies continue to advance, these roles will become more specialized and integral to organizational success. We anticipate that as AI becomes more capable, the creative and strategic components of these roles will gain even greater importance, requiring professionals to continually enhance their creative and technical skills" (R20, personal communication, May 24, 2024).

(2.3) Adaptability and Lifelong Learning

The dynamic nature of AI technology in the creative and tourism sectors demands a commitment to ongoing learning and adaptability from professionals. As AI tools and applications continually evolve, staying updated with the latest technologies and methods becomes crucial. For instance, tourism professionals might need to learn how to operate new AI-powered analytical tools like Gemini for enhanced customer data analysis. Additionally, using ChatGPT for ongoing training and education allows for real-time updates and learning in communication skills, customer interaction, and even language proficiency. These AI tools can simulate various customer service scenarios, offering professionals hands-on practice and feedback in a controlled, iterative learning environment. Furthermore, the integration of AI such as ChatGPT extends to the development of soft skills, where it can be used to coach professionals on improving interpersonal communication, problem-solving, and even crisis management by providing scenarios that reflect real-world challenges. Institutions and businesses in these sectors can support this continuous professional development by offering workshops, training sessions, and access to online learning platforms that focus on emerging AI technologies, including how to effectively integrate and utilize these AI tools. This proactive approach to professional development is essential, as it ensures that employees are not only skilled in using current AI technology but are also prepared to adapt to future advancements. This commitment to lifelong learning ensures that professionals are not only able to adapt to changing technologies but also excel in utilizing these advancements to innovate and improve their practices. By fostering an environment of continuous learning and adaptability, businesses can maintain a competitive edge in the fast-evolving landscape of the creative and tourism industries, where technological proficiency and innovative applications of AI can significantly influence success.

> "Adaptability and lifelong learning are essential in sectors influenced by AI, as technology evolves rapidly. What's innovative today may be standard tomorrow, requiring professionals to continually update their skills. ChatGPT is extensively used for training, creating simulated customer service scenarios that offer real-time feedback to professionals. This practice enhances their communication skills and customer interaction techniques. In the tourism sector, the tool Gemini is utilized for customer data analysis, helping professionals predict and understand customer behavior—a key aspect of personalizing services and improving guest experiences. This training ensures professionals are proficient in effectively extracting and interpreting data" (R13, personal communication, May 21, 2024).

> "We support continuous learning through a variety of initiatives. These include regular workshops and training sessions on the latest AI tools and methods, as well as access to online learning platforms that offer courses on emerging AI technologies. Our aim is to ensure that every professional has the resources to

learn and adapt continuously. One of the main challenges is the sheer pace of technological advancement, which can be overwhelming. To address this, we emphasize a culture of learning and curiosity within our organizations. We provide structured support through mentoring and peer-learning groups, which help professionals share knowledge and stay updated together. This collaborative approach fosters a supportive environment where continuous education and adaptation are integral to professional growth and organizational success" (R14, personal communication, May 22, 2024).

"Educational institutions are crucial in adapting curricula to include AI and data analytics, helping learners understand AI's practical implications in their future careers. They are fostering partnerships with industry leaders, providing real-world experience through internships and live projects focused on AI applications. Additionally, the role of organizational culture is significant in promoting an environment conducive to learning and innovation. Such cultures encourage employees to embrace change and view failures as learning opportunities, which is vital for fostering adaptability in fields continuously evolving due to technological advancements" (R18, personal communication, May 24, 2024).

"I see AI becoming more integrated into professional development processes. AI could personalize learning pathways for each professional based on their unique strengths and areas for improvement. It will likely play a role in assessing skill development more accurately and providing targeted feedback, enhancing the overall learning experience. In my view, commitment to lifelong learning for maintaining a competitive edge in these industries is absolutely vital. The fields of creativity and tourism are highly dynamic, and the ability to quickly adapt to new technologies and methods can set a business apart from its competitors. By fostering an environment where ongoing learning is valued and supported, we not only enhance individual careers but also drive innovation and success at the organizational level" (R19, personal communication, May 24, 2024).

In conclusion, the integration of ChatGPT and Gemini in the education and creative economy and tourism sectors not only drives economic growth through improved efficiencies and new revenue streams but also reshapes career landscapes. It creates new opportunities and demands for skills that blend traditional expertise with technological proficiency, fostering a more dynamic and future-ready workforce.

4.5 Empirical Evidence of ChatGPT and Gemini' Impact on Business Operations: A Case Study of a Hotel in Ao Nang, Krabi, Thailand

The researcher conducted an in-depth interview with a hotel owner to gain insights into the practical impacts of implementing AI tools, specifically ChatGPT and Gemini, on daily operations, customer interactions, and overall business performance. Focusing on a two-month analysis of AI implementation, the hotel owner provided detailed information about key performance metrics, including occupancy rates, response times and others. During the interview, the hotel owner highlighted specific improvements resulting from these tools, such as enhancements in guest satisfaction scores due to quicker response times and measurable increases in employee productivity. The researcher also explored the hotel owner's perspectives on the broader implications of AI, asking about initial challenges encountered during implementation, any role adjustments made for staff, and feedback received from both customers and employees regarding the integration of AI. Furthermore, the researcher inquired about the hotel owner's outlook on AI's future potential, delving into areas where further technological advancements might support business growth or boost operational efficiency. This comprehensive discussion provided valuable information on how AI tools like ChatGPT and Gemini influenced the hotel's competitive positioning and contributed to its overall success.

Table 4.77 Hotel Profile

Characteristic	Description
Hotel Category	4-Star Hotel
Location	Ao Nang, Krabi, Thailand
Number of Rooms	180 Rooms
Staff Size	120 (Full-Time Equivalent)
Average Occupancy	January, 2024: 72% and February, 2024: 78%
AI Implementation	ChatGPT and Gemini

According to Table 4.77, the case study was conducted over a two-month period (January-February 2024) at a 4-star business hotel. The property maintains 180 rooms with a staff complement of 120 full-time equivalent employees. During the study period, occupancy rates showed positive growth, increasing from 72% in January, 2024, to 78% in February, 2024, indicating strong market performance. This occupancy increase provided an ideal testing environment for the newly implemented AI systems, as it allowed for performance assessment under varying levels of operational demand.

Table 4.78 January and February Performance Metrics

Period	Check-Ins	AI Processed	Average Time	AI Usage
Week 1 (January 1-7)	245	201	3.3 Minutes	82%
Week 2 (January 8-14)	258	219	3.1 Minutes	85%
Week 3 (January 15-21)	262	231	3.0 Minutes	88%
Week 4 (January 22-31)	285	257	2.9 Minutes	90%
Week 5 (February 1-7)	268	244	2.8 Minutes	91%
Week 6 (February 8-14)	272	250	2.8 Minutes	92%
Week 7 (February 15-21)	280	260	2.7 Minutes	93%
Week 8 (February 22-29)	285	265	2.7 Minutes	93%

AI Usage % = (Number of AI-Assisted Transactions / Total Transactions) × 100

Total Check-Ins: 2,155

Average AI Usage: 89.5%

According to Table 4.78, the eight-week implementation of ChatGPT and Gemini in front desk operations demonstrated a systematic progression in efficiency and adoption. The journey began in January Week 1 with an initial 82% AI usage rate, processing 201 of 245 check-ins at an average time of 3.3 minutes, as staff navigated the learning curve through intensive training sessions. Week 2 showed promising advancement with 85% usage (219 of 258 check-ins) and reduced processing time to 3.1 minutes, reflecting growing staff confidence and system refinements. By Week 3, the system handled 231 of 262 check-ins (88% usage) at 3.0 minutes average time, incorporating advanced features such as predictive guest services. January concluded strongly with Week 4 achieving 90% usage (257 of 285 check-ins) at 2.9 minutes per check-in, marking successful integration with the property management system. February's performance continued this upward trajectory, with Week 5 reaching 91% usage (244 of 268 check-ins) at 2.8 minutes, and Week 6 improving to 92% (250 of 272 check-ins) while maintaining consistent processing times. The system achieved peak efficiency in Week 7 with 93% usage (260 of 280 check-ins) at 2.7 minutes, a level sustained through Week 8 (265 of 285 check-ins). This steady improvement culminated in a total of 2,155 check-ins processed over the two months, with average AI usage rising from 82% to 93%, demonstrating successful system maturity and staff adaptation. The implementation's success was particularly evident in the reduction of average check-in times from 3.3 to 2.7 minutes, reflecting enhanced operational efficiency and improved guest service delivery.

Table 4.79 Detailed Guest Inquiry Analysis

Inquiry Type	January	February	Growth	Resolution
Room Information	1,250	1,340	+ 7.2%	98.5%
Service Request	985	1,055	+ 7.1%	97.8%
Booking Assistance	875	935	+ 6.9%	96.9%
Local Information	740	790	+ 6.8%	99.1%

Total Inquiries: January (3,850), February (4,120)

Average Resolution Rate: 98.1%

As presented in Table 4.79, a comprehensive analysis of guest inquiries during the two-month implementation period revealed significant improvements across all categories. Room information requests dominated the inquiry types, increasing from 1,250 in January to 1,340 in February (7.2% growth), with questions primarily focusing on room amenities, view options, and availability. These inquiries achieved a remarkable 98.5% resolution rate through ChatGPT's ability to provide detailed room descriptions, virtual tours, and real-time availability updates. Service requests demonstrated similar growth, rising from 985 to 1,055 instances (7.1% increase), encompassing housekeeping requests, room service orders, and maintenance issues. The system's capability to automatically route urgent requests to relevant departments while providing immediate acknowledgment contributed to the 97.8% resolution rate in this category. Booking assistance inquiries grew from 875 to 935 (6.9% growth), with the AI system efficiently handling rate inquiries, date modifications, and special accommodation requests with a 96.9% resolution rate. Local information requests showed steady growth from 740 to 790 inquiries (6.8% increase), achieving the highest resolution rate of 99.1% through the system's comprehensive database of local attractions, transportation options, and dining recommendations. The total inquiry volume increased from 3,850 to 4,120, maintaining an impressive average resolution rate of 98.1% across all categories. This improvement was attributed to three key factors: enhanced natural language processing capabilities allowing better understanding of guest intentions, expanded knowledge base covering a wider range of scenarios, and improved integration with the hotel's property management system enabling real-time information updates and booking modifications.

Table 4.80 Email Response Analysis

Email Category	January	February	Growth	Accuracy
Booking Confirmations	720	765	+ 6.3%	99.4%
General Inquiries	680	725	+ 6.6%	98.7%
Special Request	485	520	+ 7.2%	97.9%
Feedback Responses	355	370	+ 4.2%	99.1%

Total Emails: January (2,240), February (2,380)

Average Response Time: 2.5 minutes

As presented in Table 4.80, the email response system demonstrated exceptional performance improvements across all categories during the two-month period, processing a total volume increase from 2,240 to 2,380 emails. Booking confirmations represented the largest category, growing from 720 to 765 instances (6.3% increase), achieving an outstanding 99.4% accuracy rate. These confirmations included detailed room information, check-in instructions, and personalized amenity recommendations, with an average processing time of 1.8 minutes per booking confirmation. General inquiries showed robust growth from 680 to 725 emails (6.6% increase), maintaining a 98.7% accuracy rate. These inquiries encompassed a wide range of topics, from hotel facilities and services to local attractions and transportation options. Special requests experienced the highest growth rate, increasing from 485 to 520 instances (7.2% growth), with a 97.9% accuracy rate. These requests included dietary accommodations, room preferences, and celebration arrangements, requiring more complex processing and coordination with various departments. Feedback responses showed modest but steady growth from 355 to 370 emails (4.2% increase), achieving a 99.1% accuracy rate, with the system generating personalized responses addressing specific guest comments and concerns.

Table 4.81 Internal Communication Metrics

Communication Type	January	February	Growth	Efficiency
Staff Updates	585	635	+ 8.5%	96.8%
Task Assignments	490	532	+ 8.6%	97.2%
Shift Reports	380	410	+ 7.9%	98.5%
Department Memos	225	243	+ 8.0%	99.1%

Total Communications: January (1,680), February (1,820)

Process Improvement: 32%-time savings

From Table 4.81, the internal communication system exhibited remarkable growth and efficiency improvements across all communication categories during the two-month analysis period, with total communications increasing from 1,680 to 1,820 instances. Staff updates constituted the largest volume of communications, increasing from 585 to 635 instances (8.5% growth), with a 96.8% efficiency rate. These updates encompassed daily operational briefings, policy changes, occupancy forecasts, and VIP guest notifications, enabling seamless information flow across all departments. Task assignments showed the highest growth rate, rising from 490 to 532 instances (8.6% increase), achieving a 97.2% efficiency rate. The system excelled in distributing, tracking, and prioritizing tasks across housekeeping, maintenance, food & beverage, and front office teams, with automated follow-ups and completion confirmations. Shift reports demonstrated steady growth from 380 to 410 instances (7.9% increase), maintaining an impressive 98.5% efficiency rate, providing detailed handover information, pending tasks, and critical alerts between shifting staff. Department memos, while smaller in volume, showed consistent growth from 225 to 243 instances (8.0% increase), achieving the highest efficiency rate of 99.1%, particularly effective in coordinating cross-departmental activities and special event preparations.

Table 4.82 Document Processing Metrics

Document Type	January	February	Growth	Processing
Guest IDs	285	295	+ 3.5%	12 sec/doc
Registration Forms	265	275	+ 3.8%	15 sec/doc
Invoice Processing	205	215	+ 4.9%	18 sec/doc
Report Generation	135	140	+ 3.7%	25 sec/doc

Total Documents: January (890), February (925)

Accuracy Rate: 99.2%

As presented in Table 4.82, the document processing system demonstrated significant efficiency improvements across all categories during the two-month period, processing an increased total volume from 890 to 925 documents. Guest ID processing, the most frequent category, showed steady growth from 285 to 295 instances (3.5% increase), with an impressive average processing time of 12 seconds per document. The system's high-speed scanning and verification capabilities enabled rapid authentication of various identification documents, including passports, national IDs, and driving licenses, while maintaining a 99.6% accuracy rate. Registration form processing increased from 265 to 275 instances (3.8% growth), with the system efficiently handling both digital and scanned paper forms in an average of 15 seconds per document, representing a 75%-time reduction compared to manual processing.

Table 4.83 Translation Service Analytics

Document Type	January	February	Growth	Accuracy
Guest Communications	165	180	+ 9.1%	98.7%
Documents	120	130	+ 8.3%	99.1%
Signage	85	90	+ 5.9%	99.8%
Menu Items	55	60	+ 9.1%	99.4%

Total Translations: January (425), February (460)

Languages Supported: 28

Average Translation Time: 1.8 seconds per request

From Table 4.83, the translation service demonstrated remarkable performance and growth across all categories during the two-month analysis period. Guest communications emerged as the dominant category, showing a significant increase from 165 to 180 instances (9.1% growth) while maintaining an impressive 98.7% accuracy rate. This category primarily handled check-in/out instructions, service requests, facility inquiries, and emergency communications, with an average processing time of 1.8 seconds per request. Document translations showed substantial growth, rising from 120 to 130 instances (8.3% increase) with a 99.1% accuracy rate, covering essential materials such as registration forms, hotel policies, and service agreements. The system efficiently processed these documents at an average rate of 2.5 seconds per page across multiple language pairs simultaneously. Signage translations, while showing more modest growth from 85 to 90 instances (5.9% increase), achieved the highest accuracy rate at 99.8%, managing directional signs, safety instructions, and facility information across 28 languages. Menu item translations demonstrated strong growth, increasing from 55 to 60 instances (9.1% growth) with a 99.4% accuracy rate, handling daily menu updates, special dietary information, and cultural adaptations of culinary descriptions.

Table 4.84 Monthly Guest Satisfaction Scores

Metric	January	February	Change
Overall Satisfaction	4.6/5	4.8/5	+ 4.3%
Staff Responsiveness	4.7/5	4.8/5	+ 2.1%
Problem Resolution	4.5/5	4.7/5	+ 4.4%
Communication Clarity	4.8/5	4.9/5	+ 2.1%

Total Surveys Collected: January (425), February (468)

According to Table 4.84, the guest satisfaction analysis revealed significant improvements across all measured metrics during the two-month study period, with data collected from a robust sample of 425 surveys in January, increasing to 468 in February. Overall satisfaction demonstrated the most substantial improvement, rising from 4.6/5 to 4.8/5 (4.3% increase), driven by enhanced room quality ratings (4.7 to 4.8), improved service delivery (4.5 to 4.7), and better amenity satisfaction (4.6 to 4.8). Staff responsiveness showed steady improvement, increasing from 4.7/5 to 4.8/5 (2.1% growth), with notable enhancements in check-in speed (reduced from 3.2 to 2.8 minutes) and request handling time (decreased from 8.5 to 7.2 minutes). Problem resolution metrics displayed significant progress, improving from 4.5/5 to 4.7/5 (4.4% increase), with first-contact resolution rates rising from 85% to 92% and average resolution time decreasing from 15 to 12 minutes. Communication clarity achieved the highest scores, advancing from 4.8/5 to 4.9/5 (2.1% improvement), supported by enhanced language accuracy (98% to 99%) and information completeness (96% to 98%). The demographic analysis of survey respondents showed a balanced representation, with business travelers comprising the largest segment (45% in January, increasing to 48% in February), followed by leisure guests (35% decreasing to 32%), and group bookings maintaining a steady 20% share. This comprehensive improvement across all metrics was attributed to enhanced AI integration, improved staff training, streamlined processes, and better service quality management, resulting in more consistent and personalized guest experiences. The increased survey participation rate, rising from 68% to 75%, further validated the reliability of these improvements, demonstrating guests' increased engagement with the hotel's feedback systems and their growing satisfaction with the enhanced service delivery model.

4.5.1 ChatGPT and Gemini Implementation and Workforce Transformation Analysis

The in-depth interview with the owner of a 4-star hotel in Ao Nang, Krabi, Thailand revealed significant insights into workforce transformation during AI implementation, particularly regarding job displacement and emerging opportunities. The owner candidly discussed how AI implementation affected various positions within the hotel operations, noting that while some traditional roles faced reduction, new opportunities emerged simultaneously. In the front office, junior receptionists and reservation clerks experienced the most significant impact, with AI handling 93% of check-in/out tasks and 99.4% of booking confirmations. Back-office positions such as data entry clerks and basic translators were similarly affected, with document processing becoming 99.2% automated and translation services covering 28 languages at 98.7% accuracy. However, the owner emphasized that this transition led to role transformation rather than complete elimination, reducing traditional operational roles by approximately 15% while creating new positions requiring higher-level skills and offering better compensation.

The hotel's response to these changes focused on workforce evolution through a comprehensive transition program. New positions emerged in three key areas: technology integration (AI Systems Supervisors, Digital Experience Managers), guest experience enhancement (Personal Guest Relations Managers, Experience Curators), and digital nomad support (Remote Work Facility Managers, Digital Community Coordinators). The owner noted, “Our goal is to manage this transition humanely and responsibly. We are investing in our existing staff to help them adapt to new roles rather than simply replacing them.” This commitment was demonstrated through various impact mitigation measures, including retraining opportunities, internal promotion pathways, skill development programs, and career counseling services.

Notably, the hotel's transformation has created significant opportunities in the digital nomad market segment. “The implementation of AI has allowed us to better serve the growing digital nomad community”, the owner explained. The hotel has seen a 25% increase in extended-stay bookings and a 35% growth in digital nomad guests, driven by enhanced facilities including co-working spaces, high-speed internet infrastructure, and AI-powered multilingual support. The property has introduced specific digital nomad packages featuring flexible long-term booking options, dedicated workspace amenities, and community-building events. This market adaptation has created new roles, such as Digital Community Coordinators, who focus on ensuring digital nomad guests have optimal conditions for remote work while enjoying their stay. The owner emphasized that revenue from digital nomad-focused services has grown by 40%, offsetting any initial investment in AI implementation and workforce transformation.

While direct GDP figures are not available, several key economic indicators suggest positive contributions to the area's economy. The hotel's transformation into a digital nomad hub, evidenced by a 25% increase in extended-stay bookings and a 35% growth in digital nomad guests, has generated a 40% revenue increase from digital nomad-focused services. This shift represents a significant evolution in the local tourism sector, moving from traditional short-term tourism to more sustainable, long-term stays that typically contribute more substantially to the local economy through sustained spending patterns. The workforce transformation, although showing a 15% reduction in traditional operational roles, has led to the creation of higher-paying positions such as AI Systems Supervisors, Digital Experience Managers, and Digital Community Coordinators, potentially increasing local spending power and tax contributions. Operational improvements, including a 93% AI usage rate in check-in processes and support for 28 languages, have enhanced the hotel's international accessibility and competitiveness. The multiplier effects extend beyond the hotel itself, stimulating growth in supporting businesses, increasing demand for local tech support services, and driving investment in digital infrastructure. The transition from traditional tourism to a digital nomad hub suggests a reduction in seasonal economic fluctuations, as digital nomads provide a steadier year-round economic presence. Furthermore, the development of enhanced digital infrastructure and modern workplace facilities has created a more robust business ecosystem, potentially attracting additional investment and business opportunities to the area. The hotel's improved operational efficiency, evidenced by increasing occupancy rates from 72% to 78% over two months, along with high guest satisfaction scores and efficient service delivery, suggests a sustainable model for economic growth in the region's hospitality sector. These combined factors indicate that while the initial AI implementation required investment, the resulting economic transformations are likely contributing positively to the local GDP through direct revenue growth, job market evolution, and broader economic modernization effects. Looking toward the future, the hotel's implementation strategy emphasized gradual transition over 6-12 months, prioritizing internal candidates for new positions and providing training allowances for skill development. While AI implementation inevitably led to some job displacement, it primarily created opportunities for workforce evolution, with successful transition depending on thoughtful management and support for staff willing to adapt to the changing hospitality landscape. This approach not only maintained operational efficiency but also fostered a positive environment for both traditional hospitality roles and emerging digital-focused positions.

Chapter 5

Discussions and Conclusions

This chapter presents a comprehensive synthesis of the research findings, implications, and directions for future inquiry. Initially, the study's key results are recapitulated. Subsequent sections delve into detailed discussions, drawing inferences from the findings. It concludes by offering insights into the research's practical applications and identifying areas for further exploration. The structure is as follows:

5.1 Summary of Results

5.2 Discussions

5.3 Conclusions

5.4 Research Implications and Recommendations

5.5 Limitations and Future Research

5.1 Summary of Results

The data strongly supports the perception of ChatGPT as a valuable asset for professional development and career progression. The data indicates consistently positive perceptions of ChatGPT's utility and impact. Respondents view ChatGPT as effective in facilitating learning and providing valuable opportunities. They express a strong intention to continue using ChatGPT and recommending it to others. While most respondents do not see ChatGPT as a threat to their careers, this perception shows some variability. Additionally, users find ChatGPT easy to use and believe it enhances their professional skills. The study also reveals a complex interaction among demographic factors, awareness, and social media usage in predicting ChatGPT adoption. Key variables influencing adoption include awareness, age, gender, status, and engagement with specific social media platforms, such as Instagram, X, TikTok, and YouTube.

A similar favorable disposition is observed towards Gemini, with users recognizing it as a significant tool for professional development and task execution. The data reveals strong agreement with statements regarding Gemini's potential to enhance professional skills, facilitate learning, and improve career efficiency. Respondents also exhibit a strong intention to recommend Gemini to others and to continue using it in the future. Additionally, there is confidence that Gemini does not pose a threat to their careers or replace their roles, indicating that AI is viewed as a complementary tool rather than a substitute for human skills. The study also highlights the intricate interplay of demographic factors, awareness, and social media usage in predicting Gemini adoption. Influential factors include awareness, gender, age, education, and the use of social media platforms, particularly X and TikTok.

In terms of opportunities associated with ChatGPT, the analysis identifies education and engagement with platforms like X and TikTok as strong positive predictors. Conversely, variables such as awareness, age, status, and gender show significant negative associations, suggesting they may hinder the perceived benefits of ChatGPT. Regarding disruptions, awareness, age, education, status, income, and engagement with platforms such as Facebook, Instagram, and TikTok play crucial roles in shaping perceptions, indicating how individual characteristics and social media usage influence views on ChatGPT-related disruptions.

For Gemini, perceptions of opportunities are similarly complex, with education and TikTok usage emerging as positive predictors, while gender, age, and awareness are linked to negative perceptions. Regarding disruptions, education, status, income, and TikTok engagement are positive predictors, whereas age and awareness show negative associations. This highlights how perceptions of Gemini-related disruptions are influenced by a nuanced combination of individual characteristics, awareness levels, and social media engagement.

The integration of ChatGPT and Gemini across sectors such as the education and the creative economy and tourism introduces numerous opportunities and potential disruptions. These technologies can enhance educational outcomes, streamline operations, and foster innovation in tourism and creative industries. However, they also present challenges such as job displacement, privacy concerns, and the risk of exacerbating existing inequalities. The adoption of AI technologies is thus substantially transforming these sectors' economic landscapes and career development opportunities, enhancing operational efficiencies, and creating new avenues for revenue generation, competitive differentiation, and professional advancement.

5.2 Discussions

This section discusses the factors influencing the adoption of ChatGPT and Gemini, as well as the opportunities and disruptions generated by these technologies. It will also address the economic impact and career development implications associated with ChatGPT and Gemini. The discussion will compare these findings with previous research to highlight similarities and differences, providing a comprehensive overview of how these technologies align with or diverge from established studies.

5.2.1 Factors Influencing Adoption

The study's findings strongly support the perception of ChatGPT and Gemini as a valuable asset for professional development and career progression. This positive reception aligns with current trends in the adoption of AI technologies in professional contexts and has significant implications for the future of work and learning. The consistently positive perceptions of ChatGPT and Gemini's utility and impact align with recent research on AI adoption in professional settings. For instance, Kaplan and Haenlein (2019) argue that AI technologies are increasingly seen as tools for enhancing human capabilities rather than replacing them. The positive reception of ChatGPT and Gemini supports this view, suggesting that professionals see it as an augmentative tool rather than a replacement for human skills. Moreover, the perception of ChatGPT and Gemini as effective in facilitating learning is consistent with emerging research on AI in education. Holmes et al. (2022) confirmed that AI can provide personalized learning experiences, which may explain why respondents view ChatGPT and Gemini as an effective learning tool. In addition, the strong intention to continue using and recommending ChatGPT and Gemini can be understood through the lens of technology acceptance models. The Technology Acceptance Model (TAM) proposed by Davis (1989) suggests that perceived usefulness and perceived ease of use are key determinants of technology adoption. The findings indicate that ChatGPT and Gemini score highly on both these factors, explaining the strong intention for continued use and recommendation. Furthermore, the perception of ChatGPT and Gemini as easy to use and beneficial for professional skills is crucial for its adoption and integration into professional practices. As Horodyski (2023) underscores, positive user perceptions, notably the perception of increased efficiency, are key determinants of technology adoption. This aligns with the broader principle that individuals' beliefs in their technological capabilities significantly influence their inclination to integrate these tools into their workflows. Additionally, the emergence of advanced language models such as ChatGPT and Gemini has profound implications for education and lifelong learning. As highlighted by Leite (2024), these AI-powered tools demonstrate potential as valuable resources for teaching and learning, offering coherent responses to complex queries. While their integration into educational settings warrants careful consideration, the future trajectory indicates that AI chatbots will become indispensable tools for users, fostering active and critical learning.

Regarding the adoption of ChatGPT and Gemini, the analysis reveals a complex interplay of factors, including demographic characteristics, awareness levels, and social media usage patterns. These elements collectively shape the likelihood of individuals adopting ChatGPT and Gemini, highlighting the multifaceted nature of technology adoption. Interestingly, the 'Score' variable, representing awareness, demonstrates an inverse relationship with adoption likelihood, suggesting that increased awareness may not necessarily translate to higher adoption rates for both ChatGPT and Gemini. Greater awareness might reveal the complexity of integrating these technologies into existing workflows or systems. This perceived complexity could deter some potential adopters. Furthermore, gender emerges as a significant predictor of both

ChatGPT and Gemini adoption, with one gender category (being a male) showing a markedly higher propensity for adoption. Men tend to view AI applications more positively, rate their own AI competencies higher, and have more trust in the technology compared to women, as indicated by Armutat, Wattenberg, and Mauritz (2024). This gender disparity in AI tool adoption could have important implications for equity in access to and benefits from AI technologies in various professional and educational contexts. This study's findings align with those of Jangjarat et al. (2023), who investigated public perceptions of ChatGPT as a robo-assistant in Thailand. Their research confirmed the acceptance of ChatGPT among the Thai population and found that awareness of ChatGPT as a robo-assistant could be described by scores and was influenced by gender. Kraiwanit et al. (2023) indicated that gender impacts the intention to use technology like the Worldcoin wallet in Thailand, with males being less inclined to use the wallet compared to females. This gender difference could be attributed to various factors, such as disparities in financial behavior and technology adoption rates.

Age exhibits a negative association with adoption likelihood, indicating that younger individuals are more inclined to adopt ChatGPT and Gemini. This age-related trend aligns with common observations in technology adoption patterns and may reflect generational differences in openness to new technologies or exposure to AI tools. The negative association between age and adoption likelihood, with younger individuals more inclined to adopt ChatGPT and Gemini, is consistent with established patterns in technology adoption. The study's findings align with a report by Kolm (2020), which indicates that Generation Z has not embraced the “early adopter” status with the same enthusiasm as previous generations. The survey revealed that 3% of Baby Boomers consider themselves early adopters of technology, a number that increases to 8% for Generation X and 13% for Millennials, but drops slightly to 12% for Generation Z. Additionally, 49% of Generation Z identify as quick, but not the first, to adopt new technology, compared to 47% of Millennials, 36% of Generation X, and 25% of Baby Boomers. The report suggests that the “flattening” of early adoption rates among generations may be due to Generation Z's relatively lower purchasing power compared to Millennials, limiting their access to new technology. Moreover, Generation Z has witnessed fewer major technological advancements compared to Millennials, and their upbringing with the internet and mobile devices may have “normalized” the technological advances they encounter.

Education level shows a positive relationship with adoption, suggesting that individuals with higher educational attainment are more likely to adopt Gemini. This finding may reflect the potential complexity of the tool or its perceived relevance to higher-level academic or professional tasks. In line with Riddell and Song (2017), there is a strong positive correlation between education levels and technology adoption in the workplace. Higher education levels increase the probability of using computers on the job, with more educated employees spending more time using computers and having longer work experiences with computers compared to those with less education. Scheerder, Van Deursen, and Van Dijk (2017) also indicated that education influences various aspects of Internet skills and usage, which can be extended to more complex technologies like AI tools. Moreover, Kraiwanit et al. (2023) indicated that higher levels of education positively influence the intention to use technology like the Worldcoin wallet. More educated individuals may have a better understanding of the benefits and security features of digital wallets, making them more willing to use this technology.

Marital status, specifically being single, is negatively associated with technology adoption. This finding suggests that relationship status may influence technology adoption behaviors, potentially due to differences in time availability, social influences, or lifestyle factors between single and non-single individuals. Consistent with the findings of Jacob, Sezgin, Sanchez-Vazquez, and Ivory (2020), marital status is recognized as a significant demographic factor influencing the adoption of technological tools. Being single or living alone often presents a barrier, likely due to the absence of accountability and support that a significant other might provide. Niehaves and Plattfaut (2014) indicated that social support, often provided by a partner, can influence technology adoption among older adults. Although Correa, Straubhaar, Chen, and Spence (2015) focused on children's influence, their findings also indirectly support the idea that living with others can promote technology adoption.

Social media usage patterns exhibit varying influences on ChatGPT adoption. Users of Instagram, X, and TikTok show a higher likelihood of adopting ChatGPT, whereas YouTube usage is negatively associated with its adoption. These platform-specific effects may reflect differences in user demographics, content types, or the nature of user engagement across these platforms. The contrasting effects of social media platform usage on Gemini adoption are also noteworthy. While TikTok usage positively correlates with Gemini adoption, X usage shows a negative association. These differences may similarly be attributed to variations in user demographics, content types, or the nature of user engagement, influencing the perceived utility or appeal of Gemini. The study's findings align with those of Kraiwanit et al. (2023), which indicated that greater engagement with social media is linked to a decreased intention to use technology like the Worldcoin wallet. This may be due to concerns about privacy and security related to digital wallets among individuals highly engaged with social media. Similarly, Jangjarat et al. (2023) indicated that ChatGPT awareness and usage are influenced by variables such as social media usage. Instagram users show a higher likelihood of adopting ChatGPT. This platform is known for its visual content and younger user base. According to Perrin and Anderson (2019), the platform's focus on creativity and visual storytelling may attract users who are more open to innovative technologies like ChatGPT. Moreover, TikTok usage positively correlates with both ChatGPT and Gemini adoption. TikTok is known for its short-form video content and has a predominantly young user base. Barta, Belanche, Fernández, and Flavián (2023) found that TikTok is distinctive in its use of humor, which enhances the effectiveness of messages through hedonic experiences. Additionally, TikTok users exhibit a greater likelihood of engaging with trending topics and novel ideas. This openness to novelty may elucidate the positive association observed with the adoption of AI tools. YouTube usage is negatively associated with ChatGPT adoption. This is an interesting finding, given YouTube's diverse content. Khan (2017) found that YouTube is used more for entertainment and less for social interaction compared to other platforms. This passive consumption pattern might explain the lower adoption rates of interactive AI tools like ChatGPT among heavy YouTube users.

5.2.2 Opportunities and Disruptions

The analysis of factors influencing the perception of ChatGPT and Gemini opportunities reveals a complex interplay of demographic characteristics, awareness levels, and social media usage patterns, each contributing distinctively to how individuals view the potential benefits of this AI technology.

The inverse relationship between awareness and the perception of opportunities is particularly noteworthy. This counterintuitive finding suggests that increased awareness of ChatGPT and Gemini does not necessarily lead to a more optimistic view of its potential benefits. This phenomenon warrants further investigation into the nature of awareness and its impact on technology perception. It may indicate that deeper understanding or exposure to the technology might reveal limitations or complexities not apparent at surface level, or perhaps that initial enthusiasm wanes with increased familiarity. The study's findings align with Rogers (2003), indicating that increased knowledge about an innovation does not always lead to its adoption. This observation suggests that other factors, such as personal relevance, social influence, and perceived benefits or drawbacks, may play more critical roles in the decision-making process. Despite individuals being well-informed about an innovation, their likelihood of adopting it may still be influenced by these additional considerations, highlighting the complexity of the adoption process.

Gender emerges as a significant predictor of opportunity perception, with males being notably less likely to perceive opportunities associated with ChatGPT and Gemini. This substantial gender disparity in AI opportunity perception could have significant implications for equity in the development, implementation, and benefits derived from AI technologies across various sectors. It highlights the need for targeted efforts to ensure that diverse perspectives are incorporated into discussions about AI opportunities and to address potential gender-specific barriers to perception or access. Traditionally, research has suggested that males are more likely to adopt new technologies or perceive technological opportunities. For example, Venkatesh and

Morris (2000) found that men's technology adoption decisions were more strongly influenced by their perceptions of usefulness. However, the current findings challenge this perspective, suggesting a potential shift in gender dynamics with regard to AI technologies. This discrepancy may be attributed to differences in how AI is presented and taught, which could resonate differently with various genders. Master, Cheryan, and Meltzoff (2016) indicated that girls often felt they did not fit in with computer science stereotypes, which affected their sense of belonging and interest in stereotypical classrooms. During adolescence, a crucial period for forming career aspirations, girls might avoid computer science courses because existing stereotypes suggest they do not belong in the field.

Age exhibits a negative association with the perception of opportunities, suggesting that younger individuals are more inclined to recognize potential benefits in technologies such as ChatGPT and Gemini. This age-related trend may reflect generational differences in technology optimism, exposure to AI applications, or perceived relevance to future career prospects. It raises important questions about bridging the generational gap in perception and ensuring that the benefits of AI technologies are effectively communicated across all age groups. However, Vogels (2019) demonstrated that younger adults tend to view technology's impact on society more positively, and this general optimism may extend to AI technologies like ChatGPT and Gemini. Younger individuals, often referred to as "digital natives," tend to exhibit greater comfort and optimism towards new technologies. Prensky's (2001) concept of digital natives versus digital immigrants provides a framework for understanding this generational divide. Younger generations have grown up with digital technologies and may therefore be more receptive to AI advancements. However, it is important to note that the concept of digital nativity has been critiqued. For instance, Kirschner and De Bruyckere (2017) argue that being a digital native does not necessarily equate to digital competence or a more positive attitude towards all technologies.

Education level shows a strong positive relationship with opportunity perception, suggesting that individuals with higher educational attainment are more likely to recognize potential benefits of ChatGPT and Gemini. This finding may reflect a greater understanding of AI's capabilities and potential applications in academic or professional contexts among those with higher education. It also highlights the potential role of education in shaping perceptions of AI technologies and underscores the importance of AI literacy across all educational levels. The study’s findings were consistent with previous research. Those with higher education may be more aware of the potential applications of AI in various fields. Makridakis (2017) discusses how AI is likely to impact various professional sectors, many of which require higher education. This awareness of potential applications may contribute to a more positive perception of AI opportunities. Moreover, higher education often correlates with increased digital literacy. Scheerder et al. (2017) found that education level is a significant predictor of internet skills and outcomes. This digital literacy may translate into a greater ability to envision and understand the potential benefits of AI technologies. Furthermore, while higher education is associated with more positive perceptions of AI opportunities, it's important to note that this doesn't necessarily translate to uncritical acceptance. Higher education also cultivates critical thinking skills, which may lead to a more nuanced understanding of both the opportunities and challenges presented by AI technologies, as demonstrated by Brundage et al. (2018).

The relationship status of being single is negatively associated with the perception of opportunities specifically for ChatGPT. This intriguing finding suggests that relationship status may influence how individuals view technological opportunities, possibly due to differences in life priorities, social influences, or exposure to diverse perspectives. Couples may engage in more discussions about new technologies, leading to increased awareness and positive perceptions. Crossler, Bélanger, and Ormond (2019) revealed how family members influence each other's cybersecurity behaviors, a concept that could extend to perceptions of AI technologies. Furthermore, relationship status may influence economic considerations, which in turn affect perceptions of technological opportunities. For instance, Zhao and Wang (2022) found that marital status influenced consumer spending patterns, which could extend to investment in or interest in new technologies.

The divergent effects of social media platform usage on the perception of ChatGPT opportunities are particularly noteworthy. While usage of Platform X is positively associated with opportunity perception, TikTok usage exhibits an exceptionally strong positive correlation with perceiving such opportunities. These platform-specific effects likely reflect differences in content type, user demographics, or the nature of discourse surrounding AI technologies on these platforms. Furthermore, the significant positive association between TikTok usage and the perception of Gemini opportunities is especially remarkable, given the absence of significant associations with other social media platforms. This platform-specific effect may be attributed to the distinctive characteristics of TikTok's user base, content format, or the nature of AI-related discourse on the platform. This suggests that TikTok could play a pivotal role in shaping public perception of AI technologies, particularly among younger demographics. The positive association between Platform X usage and ChatGPT opportunity perception could be attributed to the platform's text-based nature and its popularity among tech-savvy users. As noted by Kwak, Lee, Park, and Moon (2010), Twitter serves as a significant platform for information diffusion, particularly in the tech sector. The discourse on X often includes discussions about emerging technologies, potentially exposing users to more nuanced and in-depth conversations about AI capabilities. In contrast, TikTok's exceptionally strong positive correlation with perceiving opportunities for both ChatGPT and Gemini is particularly intriguing. TikTok's short-form video format allows for creative and engaging content about AI technologies. As Zhang, Wu, and Liu (2021) discuss, TikTok's algorithm is highly effective at exposing users to content aligned with their interests, potentially increasing exposure to AI-related content for interested users.

The analysis of factors influencing the perception of ChatGPT and Gemini disruptions also reveals a complex interplay of demographic characteristics, awareness levels, and social media usage patterns, each contributing distinctively to how individuals view the potential disruptive effects of this AI technology.

The awareness variable demonstrates a slightly inverse relationship with the perception of disruptions, suggesting that increased awareness of ChatGPT and Gemini may marginally reduce the likelihood of perceiving its disruptive potential. This finding, while subtle, indicates that familiarity with the technology might somewhat mitigate concerns about its disruptive impact. It is important to note that the relationship between awareness and perception of AI technologies is complex and not always linear. Fast and Horvitz (2017) found that public perception of AI has varied over time, with periods of optimism and concern, suggesting that increased awareness doesn't always lead to reduced perception of disruption. Furthermore, Cave et al. (2018) argue that perceptions of AI are heavily influenced by cultural narratives and media representations, which can shape how increased awareness translates to perceptions of disruption.

Age emerges as a significant predictor of disruption perception, with older individuals being significantly less likely to perceive ChatGPT and Gemini as disruptive. This substantial age-related trend may reflect generational differences in technology adaptability, perceived job security, or understanding of AI's potential impact on various sectors. It raises important questions about how perceptions of technological disruption vary across different life stages and career phases. The lower perception of disruption among older individuals could be related to their career stage and job security. Frey and Osborne's (2017) influential study on the future of employment and automation found that certain occupations are more susceptible to computerization. Older workers, often in more senior or specialized roles, might perceive themselves as less likely to be displaced by AI technologies, leading to a lower perception of disruption. Czaja et al. (2006) found that older adults generally have more difficulty adapting to new technologies compared to younger individuals, although prior experience with similar technologies can mitigate this difficulty. This suggests that the lower perception of disruption among older individuals might reflect confidence gained from successfully adapting to previous technological changes throughout their careers. Furthermore, the age-related trend could also reflect differences in understanding or awareness of AI's potential impact. Gnambs and Appel (2019) found that older adults were less likely to believe in the imminent impact of AI on various job sectors. This could be due to differences in exposure to information about AI or varying levels of engagement with emerging technologies. Addressing these gaps is crucial for fostering a comprehensive understanding of AI's potential impact across all age groups.

Education level shows a positive relationship with perceiving disruptions, suggesting that individuals with higher educational attainment are more likely to recognize the potentially transformative impact of ChatGPT and Gemini. This finding may reflect a deeper understanding of AI's capabilities and its potential to reshape various professional and academic domains. It underscores the role of education in shaping critical perspectives on emerging technologies. Higher education often exposes individuals to a broader range of ideas and technologies, potentially increasing their awareness of AI's capabilities and implications. This aligns with Rogers' (2003) Diffusion of Innovations theory, which posits that knowledge is a crucial first stage in the innovation-decision process. Furthermore, individuals with higher education may have more exposure to academic and professional discourse about emerging technologies. Rainie and Anderson (2017) found that experts and academics were more likely to have nuanced views on AI's future impacts.

The strong positive association between relationship status (being single) and perceiving disruptions is particularly intriguing. This finding suggests that personal life circumstances may significantly influence how individuals view technological disruptions, possibly due to differences in perceived flexibility, career aspirations, or exposure to diverse perspectives on technological change. The life course perspective, as discussed by Elder, Johnson, and Crosnoe (2003), suggests that individual development and behavior are shaped by the social contexts and personal circumstances experienced over time. In this context, being single may influence an individual's perception of technological disruption due to different life experiences and priorities. Moreover, Venkatesh and Davis (2000) highlighted the importance of social influence in technology acceptance. Single individuals may have different social networks and support systems compared to those in relationships, potentially influencing their exposure to and perceptions of new technologies. Being single may correlate with exposure to more diverse social and professional networks, as suggested by Girme, Park, and MacDonald (2023). This diversity could lead to greater awareness of potential technological disruptions.

Income demonstrates a positive association with perceiving disruptions, indicating that higher-earning individuals are more likely to recognize ChatGPT and Gemini's disruptive potential. This could reflect a greater awareness of the economic implications of AI technologies among those in higher income brackets, or perhaps a heightened sense of the potential for disruption in high-earning professions. Higher-income individuals often have greater access to information and resources that may increase their awareness of technological trends and their economic implications. This aligns with the recent work by Han and Siau (2020), which found that individuals with higher socioeconomic status had more exposure to AI-related information, which could contribute to a heightened perception of its disruptive potential. Furthermore, higher-income individuals may be more likely to work in industries or roles where AI's impact is more immediately apparent or discussed. Nedelkoska and Quintini (2018), in an Organization for Economic Co-operation and Development (OECD) report, found that high-skilled occupations, often associated with higher incomes, may face significant changes due to AI, which could explain the increased perception of disruption among higher earners.

The contrasting effects of social media platform usage on the perception of ChatGPT disruptions are particularly striking. While Facebook usage shows a strong negative association, Instagram and TikTok usage demonstrate exceptionally strong positive correlations with perceiving disruptions. These platform-specific effects may reflect differences in content type, user demographics, or the nature of discourse about AI technologies on these platforms. The stark contrast between Facebook and other platforms is noteworthy and warrants further investigation. Furthermore, the significant positive association between TikTok usage and the perception of Gemini disruptions is particularly remarkable, given the lack of significant associations with other social media platforms. This platform-specific effect may be attributed to the unique characteristics of TikTok's user base, content format, or the nature of AI-related discourse on the platform. This suggests that TikTok could play a crucial role in shaping public perception of AI technologies' disruptive potential, especially among younger demographics. The strong negative association between Facebook usage and perception of AI disruptions is noteworthy. Theocharis and Lowe (2015) observed that maintaining a Facebook account had clearly negative consequences on reports of both offline and online forms of political and civic participation. These findings suggest that Facebook's content curation and user behavior might create an environment less conducive to recognizing potential AI disruptions. Furthermore, the strong positive correlation between Instagram usage and perception of AI disruptions aligns with recent research. Panda et al. (2024) observed that Instagram users show higher levels of engagement with future-oriented content, including technological trends, suggesting that Instagram's format may be particularly effective in communicating about AI's potential impacts. In addition, the exceptionally strong positive correlation between TikTok usage and perception of AI disruptions (for both ChatGPT and Gemini) is particularly striking. Recent research provides insights. Ambran, Zainodin, and Ali (2024) noted that TikTok's short-form video format is particularly effective for explaining complex topics in accessible ways, which could include AI disruptions. Klug, Qin, Evans, and Kaufman (2021) also observed that TikTok users are more likely to engage with and create content about future technologies compared to users of other platforms. These findings suggest that TikTok's unique format and user behavior create an environment particularly conducive to discussions about AI's disruptive potential.

The integration of AI technologies, particularly advanced language models like ChatGPT and Gemini, into sectors such as education, the creative economy, and tourism, presents a complex landscape of opportunities and potential disruptions. This technological infusion has the capacity to fundamentally transform traditional practices, offering both significant benefits and notable challenges.

In the educational sphere, AI technologies have the potential to revolutionize learning experiences by providing personalized instruction, adaptive assessment, and real-time feedback. These tools can augment teachers' capabilities, allowing for more individualized attention to students' needs and facilitating more efficient administrative processes. However, this integration also raises questions about the changing role of educators and the potential for over-reliance on AI-driven systems, which may not fully capture the nuanced, interpersonal aspects of effective teaching. The study's findings align with those of Holstein, McLaren, and Aleven (2019), who observed that AI-powered tutoring systems can significantly improve student learning outcomes by providing tailored instruction and feedback. In addition, Kamalov, Santandreu Calonge, and Gurrib (2023) concluded that AI applications in education, such as personalized learning, intelligent tutoring systems, assessment automation, and enhanced teacher–student collaboration, can improve learning outcomes, efficiency, and global access to quality education. The scalability of AI enables its benefits to reach large segments of society, facilitating high-quality education worldwide. However, the potential for AI to positively impact education is tempered by the risks of misuse. Concerns such as data privacy, security, bias, and the nature of teacher–student relationships must be addressed to ensure responsible and ethical AI implementation in education. To address these challenges, AI literacy and ethics must be integrated into curricula. By leveraging these advancements, educators and policymakers can work towards creating inclusive, equitable, and effective learning environments that cater to the diverse needs of 21st-century learners.

In the creative economy and tourism sectors, AI technologies offer opportunities for enhanced customer experiences through personalized recommendations, virtual and augmented reality experiences, and streamlined service delivery. These innovations can lead to increased efficiency, novel artistic expressions, and more immersive tourism experiences. Conversely, there are concerns about the potential homogenization of creative output and the risk of reducing authentic human interactions in tourism experiences. The study's findings align with Bulchand-Gidumal (2022), who confirmed that the use of AI chatbots in the hospitality sector improves efficiency in customer service, though it may present challenges in maintaining a personal touch. Demirciftci (2024) also indicated that as the tourism industry continues to evolve and adapt to changing consumer demands, automated systems and AI have gained significant attention. However, alongside the benefits offered by these technologies, concerns related to ethical, social, and environmental aspects have arisen.

The economic implications of AI integration are multifaceted. While these technologies can drive innovation, increase productivity, and create new job categories, they also pose risks of job displacement, particularly in routine or easily automated tasks. This dichotomy underscores the need for proactive workforce development strategies and policies to ensure equitable distribution of AI's benefits. The study's findings are consistent with Bulchand-Gidumal (2022), the substitution of the human workforce by machines has been ongoing since the First Industrial Revolution. Initially, machines could only replace humans in simple, routine tasks. However, with the advancement of AI and AI-empowered technologies, a new generation of machines, such as service robots, has emerged that can now compete with and replace humans in almost every task. Hence, worker displacement has become a significant concern regarding the impact of AI in tourism, not only due to job losses but also because of the resulting loss of a sense of belonging among workers.

Privacy and ethical considerations are paramount in the discussion of AI integration. The vast amounts of data required to power these systems raise concerns about data security, personal privacy, and the potential for misuse. Moreover, there are ongoing debates about the ethical implications of AI decision-making in sensitive areas such as education and cultural production. This study's findings align with Rane's (2024) assertion that ethical concerns, such as data privacy and algorithmic bias, necessitate a thorough examination to prevent discriminatory practices and ensure equitable employee treatment. Furthermore, the need for ongoing monitoring and refinement of AI algorithms to align with changing organizational cultures and goals presents a significant challenge.

The potential for AI to exacerbate existing inequalities is also a critical concern. Access to and proficiency with AI technologies may become a new dimension of the digital divide, potentially widening gaps in educational outcomes, economic opportunities, and social mobility. Addressing these disparities requires intentional efforts to ensure equitable access and education about AI technologies across diverse populations. In line with Farahani and Ghasemi (2024), AI can create disparities in opportunities for education, employment, and advancement. Access to AI education and training programs may be limited, leading to unequal skill development and job prospects. Biased AI algorithms used in hiring, lending, and other decision-making processes can perpetuate systemic inequalities by disadvantaged certain groups, such as minorities or individuals from low-income backgrounds.

In conclusion, the integration of AI technologies like ChatGPT and Gemini into education, the creative economy, and tourism offers transformative potential but also presents significant challenges. Maximizing the benefits while mitigating the risks requires careful consideration, adaptive policymaking, and a commitment to ethical implementation. As these technologies continue to evolve, it is crucial to maintain a balanced perspective that acknowledges both the opportunities for innovation and the imperative to preserve human values and equity in an increasingly AI-augmented world. Balancing the opportunities and risks presented by AI integration necessitates a multifaceted approach. This includes developing robust regulatory frameworks, fostering interdisciplinary collaboration between technologists, educators, and industry experts, and promoting AI literacy across society.

5.2.3 Economic Impact and Career Development

The adoption of AI technologies, particularly advanced systems like ChatGPT and Gemini, is profoundly transforming the economic landscapes and career development trajectories within sectors such as education, the creative economy, and tourism. This integration is catalyzing a paradigm shift in operational methodologies, revenue generation strategies, and professional skill requirements, thereby reshaping the very fabric of these industries. Consequently, AI is not only altering the economic and operational dynamics of these industries but also redefining the essential competencies and roles within them.

In the educational sector, AI technologies are fundamentally altering the economic model of learning institutions. By automating administrative tasks, personalizing learning experiences, and enabling scalable educational solutions, these tools are potentially reducing operational costs while simultaneously enhancing the quality and reach of educational services. This shift may lead to new revenue streams through the development of AI-enhanced educational products and services, potentially globalizing the reach of educational institutions beyond traditional geographical constraints. The study's findings align with those of Zawacki-Richter, Marín, Bond, and Gouverneur (2019), who provide a comprehensive review of AI applications in higher education, highlighting significant potential for automating administrative tasks and identifying four key areas of application: profiling and prediction, assessment and evaluation, adaptive systems and personalization, and intelligent tutoring systems. Rodway and Schepman (2023) also indicate that AI technologies can enhance service provision while yielding cost reductions. By automating routine administrative tasks, AI can empower staff to dedicate increased attention to high-impact activities such as curriculum development, instructional materials design, and scholarly inquiry.

The impact on career development within education is multifaceted. While there are concerns about potential job displacement for certain administrative roles, new career opportunities are emerging in areas such as AI-assisted curriculum development, educational data analysis, and AI-human collaborative teaching methodologies. Educators are increasingly required to develop skills in AI literacy and integration, potentially leading to new specializations and career paths within the field. Consistent with Igbokwe (2023), AI offers significant potential for revolutionizing educational administration through personalized learning, intelligent tutoring systems, streamlined administrative processes, enhanced learning outcomes, predictive analytics, data-driven decision making, and curriculum development. However, it is imperative to employ AI judiciously, ensuring it serves as a complement rather than a substitute for human educators. Moreover, Luckin and Cukurova (2019) indicated that AI emerges as a potential enhancement to traditional teaching practices rather than a replacement. By introducing innovative instructional approaches, AI algorithms and related technologies can empower educators to deliver more personalized and in-depth support to learners. To fully realize the benefits of AI in education and training, collaborative endeavors among AI developers, educators, and researchers are essential to guarantee that AI systems are grounded in rigorous research and pedagogical principles.

In the creative economy, AI technologies are fostering new forms of artistic expression and content creation, potentially expanding the marketability of creative products. AI's ability to analyze vast datasets of consumer preferences and trends enables more targeted and efficient content production and distribution strategies, which could lead to more sustainable economic models for creative industries. However, maintaining authenticity and human creativity in AI-augmented production processes remains a challenge. Aligned with the findings of Amankwah-Amoah et al. (2024), generative AI emerges as a potent catalyst for innovation within the creative industries. By generating novel ideas, AI serves as a rich source of inspiration for practitioners, stimulating fresh perspectives and catalyzing further creative exploration. The capacity of these models to produce synthetic training data holds promise for advancing the development of AI systems capable of identifying patterns, devising solutions, and expanding the frontiers of problem-solving. This dynamic interplay between human creativity and AI capabilities offers immense potential for the creation of exceptional digital products and experiences, potentially leading to more sustainable growth.

Career development in the creative sector is undergoing a substantial transformation. While there are concerns regarding AI's potential to automate certain creative tasks, new career opportunities are emerging in areas such as AI-assisted design, algorithmic art curation, and AI-human collaborative content creation. Professionals in this sector increasingly need to cultivate a hybrid skill set that merges traditional creative expertise with technological proficiency. Consistent with Khogali and Mekid (2023), the advancement of AI technology has generated new markets and employment opportunities in essential industries. Moreover, Anantrasirichai and Bull (2022) emphasize that, within the creative industries, the greatest benefits of AI will be realized when it is human-centric—designed to augment, rather than replace, human creativity. In addition, Amankwah-Amoah et al. (2024) highlight the critical juncture at which the creative industries must recognize generative AI as a collaborator rather than a substitute for human creativity. Proactive partnerships with AI systems are essential to enhance and complement creative work. This requires the strategic integration of AI tools into existing processes and the development of comprehensive strategies for their use in product development, marketing, and customer experiences. Emphasizing the importance of continuous training and upskilling, it is necessary for creative companies to invest in learning opportunities that enable employees to effectively leverage AI technologies, thereby driving innovation and maintaining competitiveness.

The tourism industry is witnessing a transformation in its economic structure through AI integration. Personalized travel recommendations, virtual tourism experiences, and AI-driven customer service are not only enhancing tourist experiences but also creating new revenue streams and business models. The ability to analyze and predict travel trends with unprecedented accuracy is allowing for more efficient resource allocation and targeted marketing strategies. In alignment with Antony and Kannan (2024), AI has significantly enhanced customer experiences through personalized recommendations, improved customer service, and language translation. Operationally, AI has optimized processes via predictive maintenance, demand forecasting, and automation, leading to increased efficiency and cost-effectiveness. Additionally, AI-driven marketing and advertising have refined customer targeting, boosting revenue. The integration of AI with virtual and augmented reality has elevated customer journeys through immersive experiences. Finally, AI contributes to sustainability by optimizing travel routes and reducing environmental impact. Consequently, AI is a transformative force in the travel sector, shaping new business models and redefining customer expectations, thereby driving business growth.

Career development in tourism is evolving to encompass new roles that bridge hospitality skills with technological expertise. Emerging career paths include AI experience designers for virtual tourism, data analysts specializing in travel patterns, and AI-human collaborative tour guides. The industry is increasingly valuing professionals who can leverage AI tools to enhance the human elements of travel and hospitality. Aligned with Çolak (2023), the integration of AI within the tourism industry is anticipated to significantly transform the employment landscape. Automation of routine tasks is expected to occur, while new roles in AI-driven customer service, data analysis, and technology-enabled entrepreneurship will emerge. The industry will require professionals skilled in AI interpretation, data management, and AI-tourism collaboration. To ensure ethical and responsible AI implementation, employment opportunities in AI ethics and tourism analytics will also be essential. Overall, the tourism workforce is poised for substantial evolution as AI technology matures.

Across these sectors, the integration of AI is necessitating a reimagining of workforce development strategies. There is a growing emphasis on continuous learning and skill adaptation, with a focus on developing competencies that complement rather than compete with AI capabilities. This shift is leading to the emergence of new educational and training paradigms, potentially creating a more dynamic and adaptable workforce. In alignment with Morandini et al. (2023), the successful integration of AI within organizations requires a multifaceted approach. Central to this strategy is the identification and development of transferable skills to bridge the current skills gap. Organizations must also provide targeted support to equip employees with the competencies necessary for AI adoption and utilization. Furthermore, fostering a positive employee mindset towards AI through ongoing training and development is essential to navigate the evolving labor market. Jaiswal, Arun, and Varma (2021) also indicated that addressing the talent gap necessitates a collaborative effort between industry and academia to develop curricula that cultivate requisite skills. As AI reshapes the economy, a shift towards a 'learning and feeling economy' is evident. This paradigm emphasizes continuous learning, upskilling, and the primacy of human-centric skills such as empathy and interpersonal abilities. Organizations must adapt by restructuring roles to prioritize these skills and invest in employee development accordingly.

The adoption of AI technologies in education, the creative economy, and tourism is catalyzing a profound economic and career development transformation. While offering significant opportunities for innovation, efficiency, and new professional pathways, this shift also presents challenges in ensuring equitable access to these opportunities. As these sectors continue to evolve with AI integration, there is a critical need for adaptive policies, innovative educational approaches, and collaborative efforts to harness the economic potential of AI while fostering inclusive and sustainable career development pathways.

5.3 Conclusions

This research provides compelling evidence of the transformative potential of advanced AI technologies, exemplified by ChatGPT and Gemini, across diverse domains. While highlighting the complexities of AI integration, the findings underscore the positive perception of ChatGPT as a valuable asset for professional development. Respondents consistently reported its utility in facilitating learning and enhancing professional skills. Although the threat of job displacement posed by AI was not universally perceived, the study reveals nuanced attitudes toward AI's role in the workplace. The ease of use and perceived benefits significantly contribute to ChatGPT's adoption. Additionally, the study demonstrates the interplay of demographic factors, AI awareness, and social media influence on technology adoption. While AI awareness does not directly correlate with adoption rates, age, gender, and education level emerge as significant predictors. Notably, younger, more educated males exhibit a higher propensity for AI adoption. Social media platforms, such as Instagram, X, and TikTok, demonstrate varying degrees of influence on AI adoption.

Furthermore, perceptions of opportunities and disruptions associated with these AI technologies demonstrate nuanced patterns. While education and social media platforms like TikTok positively correlated with perceived opportunities for both ChatGPT and Gemini, factors such as age, gender, and awareness often exhibited inverse relationships. Regarding perceived disruptions, a complex interplay of demographic factors, awareness, and social media usage emerged, with TikTok usage often associated with higher levels of perceived disruption for both platforms. Qualitatively, these AI tools offer significant potential for enhancing operational efficiencies, personalizing user experiences, and fostering innovation in fields such as education and the creative economy and tourism. In education, AI technologies are revolutionizing learning experiences through personalized instruction and adaptive assessment. The creative economy is witnessing new forms of AI-augmented content creation and more targeted production strategies. In tourism, AI is enabling highly personalized experiences and more efficient resource allocation. However, these advancements also raise important concerns regarding job displacement, particularly in administrative roles, data privacy issues related to the vast amounts of data required to power these systems, and the potential exacerbation of existing socioeconomic disparities through unequal access to AI technologies.

The economic impact of ChatGPT and Gemini is multifaceted, reshaping traditional business models and creating new revenue streams. In education, AI is potentially reducing operational costs while enhancing the quality and reach of educational services. The creative industries are seeing expanded marketability of AI-enhanced creative products. In tourism, new business models are emerging around AI-driven personalized services. Simultaneously, this technological shift is necessitating a fundamental restructuring of career development pathways. New roles are emerging that require a hybrid skill set combining traditional expertise with technological proficiency. There is a growing emphasis on continuous learning and skill adaptation, with a focus on developing competencies that complement rather than compete with AI capabilities.

This transformation underscores the critical importance of adaptive policymaking, continuous skill development, and interdisciplinary collaboration to effectively harness the benefits of AI while mitigating its potential risks. Educational institutions must adapt curricula to include AI literacy and ethics. Businesses need to invest in employee upskilling and rethinking organizational structures to effectively integrate AI. Policymakers must work on creating regulatory frameworks that encourage innovation while protecting individual rights and addressing potential socioeconomic disparities.

As these technologies continue to evolve, it is imperative that stakeholders across academia, industry, and government work cohesively to ensure that the integration of AI promotes inclusive growth, ethical implementation, and sustainable economic development. This includes developing strategies to ensure equitable access to AI technologies and education, fostering a culture of lifelong learning to keep pace with technological advancements, and creating mechanisms for ongoing dialogue between AI developers, users, and policymakers to address emerging challenges.

In conclusion, while ChatGPT and Gemini exhibit transformative potential in augmenting efficiency, innovation, and personalization across various domains, their successful integration necessitates a cautious and strategic approach. To maximize benefits while mitigating risks, a delicate balance must be achieved between leveraging AI's capabilities and preserving human values. Prioritizing ethical considerations, ensuring equitable access, and fostering a deep understanding of AI's limitations will be instrumental in shaping a future where these technologies serve as powerful tools for human advancement rather than as replacements for human ingenuity.

5.4 Research Implications and Recommendations

The findings of this study have significant implications for both practical implementation and academic research regarding the integration of AI technologies like ChatGPT and Gemini across various sectors. From a practical standpoint, there is a pressing need for targeted AI education and training programs that cater to diverse demographic groups, ensuring equitable access and skill development. These programs should be tailored to different age groups and educational levels, addressing the observed variations in AI adoption and perception. Organizations and policymakers should focus on developing inclusive AI integration strategies, implementing ethical AI frameworks, and adapting career development pathways to incorporate AI-augmented roles. This includes creating mentorship programs to support underrepresented groups in AI-related fields and establishing clear guidelines for ethical AI use in educational and professional settings. Sector-specific recommendations are crucial for maximizing the benefits of AI integration while mitigating potential risks. In education, the development of AI-enhanced curricula and personalized learning tools can revolutionize teaching and learning experiences. The creative industries should focus on fostering AI-human collaborative projects and exploring AI-augmented content creation, balancing technological innovation with human creativity. In tourism, implementing AI-driven personalized experiences while preserving authentic cultural interactions is key to enhancing visitor satisfaction without compromising cultural integrity.

Academically, this research calls for interdisciplinary studies that combine insights from computer science, social sciences, and humanities to comprehensively understand AI's societal impact. Longitudinal studies tracking changes in AI adoption patterns and perceptions over time are essential to understand the evolving relationship between AI literacy and career trajectories. Comparative analyses across cultures and sectors can provide valuable insights into how cultural factors influence AI adoption and perception, and how different educational systems and industry sectors approach AI integration. In-depth investigations into AI ethics and governance are crucial for developing theoretical frameworks that can guide policy decisions. Research into the impact of AI on skill development, particularly critical thinking and problem-solving abilities, can inform new pedagogical approaches that effectively integrate AI in teaching and learning processes. Economic impact analyses should focus on potential job creation and displacement in specific industries, developing predictive models for AI-driven economic transformations. Lastly, studies on human-AI interaction, exploring optimal models for collaboration in creative and professional contexts, are vital. This includes investigating the psychological and social impacts of increased human-AI interaction in workplace and educational settings, ensuring that AI integration enhances rather than diminishes human capabilities and well-being.

By addressing these practical and academic implications, policymakers, industry leaders, academics, civil society, and other stakeholders can strive for a more inclusive, ethical, and effective integration of AI technologies across various sectors. This multifaceted approach will not only deepen comprehension of AI's broader societal consequences but also ensure that the benefits of AI are maximized while potential risks are mitigated, fostering a future where AI augments and empowers human capabilities across all sectors of society.

5.5 Limitations and Future Research

While insightful, the present study encountered several limitations that warrant acknowledgment. First, as data collection took place during the initial stages of ChatGPT and Gemini's implementation, responses from 1,159 participants mainly reflect initial perceptions rather than long-term effects. The rapid advancement of AI means that usage patterns and impacts may have evolved since the study's completion. Additionally, while in-depth interviews with 20 respondents offered rich qualitative data, this small sample may not fully capture diverse industry experiences. Measuring employment impacts also proved challenging; at this early adoption stage, it was impractical to quantify specific job displacement or establish direct causal links between AI and workforce shifts, as respondents' views were largely speculative. Economic impact assessments were similarly constrained by timing and methodological limitations. Although participants provided insights into possible economic contributions, these qualitative findings cannot replace comprehensive GDP measurements, which would require extended observation. Future studies could address these gaps by using longitudinal designs to track AI's impact on productivity, employment, and economic factors over time, helping to clarify the effects of AI on work practices and organizational outcomes. Additionally, larger, industry-diverse samples and mixed-method approaches could enhance understanding of AI's sector-specific impacts. Research into economic contributions would benefit from standardized metrics and longer timeframes, capturing both direct and indirect effects on GDP across varied industries and regions. Further, studies exploring policy implications could offer valuable recommendations on regulatory frameworks, educational initiatives, and support systems to facilitate workforce adaptation. Given the rapid evolution of AI technologies, continuous research is necessary to understand their dynamic impacts on work practices, employment patterns, and economic outcomes. Future studies addressing these gaps will provide valuable insights for both theoretical understanding and practical application in organizational contexts.

References

Abbas, J., Aman, J., Nurunnabi, M., & Bano, S. (2019). The impact of social media on learning behavior for sustainable education: Evidence of students from selected universities in Pakistan. *Sustainability, 11*(6), 1-23. doi:10.3390/su11061683

Achu, S. (2023). *AI/ML and Deep Learning: Using linear and logistic regression in machine learning*. Retrieved from https://www.ejable.com/tech-corner/ai-machine-learning-and-deep-learning/logistic-and-linear-regression/

Aiumtrakul, N., Thongprayoon, C., Suppadungsuk, S., Krisanapan, P., Miao, J., Qureshi, F., & Cheungpasitporn, W. (2023). Navigating the landscape of personalized medicine: The relevance of ChatGPT, BingChat, and Bard AI in nephrology literature searches. *Journal of Personalized Medicine, 13*(10), 1-14. doi:10.3390/jpm13101457

Akinnuwesi, B. A., Uzoka, F. M. E., Fashoto, S. G., Mbunge, E., Odumabo, A., Amusa, O. O., … Owolabi, O. (2022). A modified UTAUT model for the acceptance and use of digital technology for tackling COVID-19. *Sustainable Operations and Computers, 3*, 118-135. doi:10.1016/j.susoc.2021.12.001

Aksorndee, P. (2017). *Behaviors and demand of consumers along the market fairs in Bang Lamung District, Chon Buri Province* (Independent Study). Retrieved from http://www.me-abstract.ru.ac.th/index.php/abstractData/viewIndex/104

Al-Hattami, H. M., & Almaqtari, F. A. (2023). What determines digital accounting systems' continuance intention? An empirical investigation in SMEs. *Humanities and Social Sciences Communications, 10*(1), 1-13. doi:10.1057/s41599-023-02332-3

Ali, Z., & Bhaskar, S. B. (2016). Basic statistical tools in research and data analysis. *Indian Journal of Anaesthesia, 60*(9), 662-669. doi:10.4103/0019-5049.190623

References (Cont.)

Alston, E. (2023, October 24). How to use Google Bard [Web log message]. Retrieved from https://zapier.com/blog/how-to-use-google-bard/

Amankwah-Amoah, J., Abdalla, S., Mogaji, E., Elbanna, A., & Dwivedi, Y. K. (2024). The impending disruption of creative industries by generative AI: Opportunities, challenges, and research agenda. *International Journal of Information Management*, *79*, 1-10. doi:10.1016/j.ijinfomgt.2024.102759

Ambran, N. S., Zainodin, W. H. W., & Ali, M. N. M. (2024). AI systems and content moderation TikTok as a digital safety platform in shaping a pleasant environment: A qualitative approach. *Journal of Media and Information Warfare*, *17*(1), 93-104. Retrieved from https://jmiw.uitm.edu.my/images/Journal/Vol17No1/Article_8.pdf

Anantrasirichai, N., & Bull, D. (2022). Artificial intelligence in the creative industries: a review. *Artificial Intelligence Review*, *55*(1), 589-656. doi:10.1007/s10462-021-10039-7

Antony, P., & Kannan, R. (2024). Revolutionizing the tourism industry through artificial intelligence: A comprehensive review of AI integration, impact on customer experience, operational efficiency, and future trends. *International Journal for Multidimensional Research Perspectives*, *2*(2), 1-14. Retrieved from https://www.chandigarhphilosophers.com/index.php/ijmrp/article/view/115

Antwi, S. K., & Hamza, K. (2015). Qualitative and quantitative research paradigms in business research: A philosophical reflection. *European Journal of Business and Management*, *7*(3), 217-225. Retrieved from https://www.researchgate.net/publication/295087782

Appel, G., Grewal, L., Hadi, R., & Stephen, A. T. (2020). The future of social media in marketing. *Journal of the Academy of Marketing science*, *48*(1), 79-95. doi:10.1007/s11747-019-00695-1

References (Cont.)

Argoti, P., & Samuleson, G. (2022). Some elements about the classical employment theory and the Keynesian perspective. *ENDLESS: International Journal of Future Studies*, *5*(2), 170-181. doi:10.54783/endlessjournal.v5i2.86

Armutat, S., Wattenberg, M., & Mauritz, N. (2024). Artificial intelligence–Gender-specific differences in perception, understanding, and training interest. *Proceedings of International Conference on Gender Research*, *7*, 36-43). doi: 10.34190/icgr.7.1.2163

Arora, S., Narayan, A., Chen, M. F., Orr, L., Guha, N., Bhatia, K., … Ré, C. (2022). Ask me anything: A simple strategy for prompting language models. *arXiv preprint arXiv*, 1-63. doi:10.48550/arXiv.2210.02441

Asanprakit, S., & Kraiwanit, T. (2023). Causal factors influencing the use of social commerce platforms. *Journal of Open Innovation: Technology, Market, and Complexity*, *9*(4), 1-11. doi:10.1016/j.joitmc.2023.100172

Ausat, A. M. A. (2023). The role of social media in shaping public opinion and its influence on economic decisions. *Technology and Society Perspectives*, *1*(1), 35-44. doi:10.61100/tacit.v1i1.37

Aydin, Ö. (2023). Google Bard generated literature review: Metaverse. *Journal of AI*, *7*(1), 1-14. doi:10.61969/jai.1311271

Barla, N. (2024, April 22). Deploying large NLP models: Infrastructure cost optimization [Web log message]. Retrieved from https://neptune.ai/blog/nlp-models-infrastructure-cost-optimization

Barta, S., Belanche, D., Fernández, A., & Flavián, M. (2023). Influencer marketing on TikTok: The effectiveness of humor and followers' hedonic experience. *Journal of Retailing and Consumer Services*, *70*, 1-12. doi:10.1016/j.jretconser.2022.103149

Batra, N. (2024). *From Bard to Gemini: Why Google renamed its AI chatbot and what it means.* Retrieved from https://www.jagranjosh.com/general-knowledge/why-google-named-bard-as-gemini-1707731175-1

References (Cont.)

Begum, A. (2022). Employment generation challenges and strategies for Pakistan: A diagnostic analysis. *Unisia*, *40*(1), 67-102. doi:10.20885/unisia.vol40.iss1.art4

Bell, E., Clarke, C., & Velasquez, V. (2023). *Generative AI: How it works, history, and pros and cons.* Retrieved from https://www.investopedia.com/generative-ai-7497939

Bergin, T. (2018). *An introduction to data analysis: Quantitative, qualitative and mixed methods*. Retrieved from https://us.sagepub.com/en-us/nam/book/introduction-data-analysis

Biswas, S. S. (2023). Role of ChatGPT in public health. *Annals of Biomedical Engineering*, 1-2. doi:10.1007/s10439-023-03172-7

Bloom, D., Canning, D., & Sevilla, J. (2003). *The demographic dividend: A new perspective on the economic consequences of population change.* Retrieved from https://www.rand.org/content/dam/rand/pubs/monograph_reports/2007/MR1274.pdf

Brundage, M., Avin, S., Clark, J., Toner, H., Eckersley, P., Garfinkel, B., … Anderson, H. (2018). The malicious use of artificial intelligence: Forecasting, prevention, and mitigation. *arXiv Preprint*, 1-101. doi:10.48550/arXiv.1802.07228

Bulchand-Gidumal, J. (2022). Impact of artificial intelligence in travel, tourism, and hospitality. In *Handbook of e-Tourism* (pp. 1943-1962). Cham: Springer International Publishing. doi:10.1007/978-3-030-48652-5_110

Cai, X., Ning, H., Dhelim, S., Zhou, R., Zhang, T., Xu, Y., & Wan, Y. (2020). Robot and its living space: A roadmap for robot development based on the view of living space. *Digital Communications and Networks*, *7*(4), 505-517. doi:10.1016/j.dcan.2020.12.001

References (Cont.)

Cao, Y., Li, S., Liu, Y., Yan, Z., Dai, Y., Yu, P. S., & Sun, L. (2023). A comprehensive survey of AI-generated content (AIGC): A history of generative AI from GAN to Chatgpt. *arXiv*, 1-44. doi:10.48550/arXiv.2303.04226

Cave, S., Craig, C., Dihal, K., Dillon, S., Montgomery, J., Singler, B., & Taylor, L. (2018). *Portrayals and perceptions of AI and why they matter*. USA: The Royal Society. doi:10.17863/CAM.34502

Chayomchai, A., Phonsiri, W., Junjit, A., & Chanarpas, M. (2023). The behavioral intention and use of digital technology in Generation Z during Thailand COVID-19 pandemic. *Journal of Liberal Arts, Maejo University, 11*(1), 216-235. Retrieved from https://so03.tci-thaijo.org/index.php/liberalartsjournal/article/view/258925

Cheong, R. C. T., Unadkat, S., Mcneillis, V., Williamson, A., Joseph, J., Randhawa, P., … Paleri, V. (2024). Artificial intelligence chatbots as sources of patient education material for obstructive sleep apnoea: ChatGPT versus Google Bard. *European Archives of Oto-Rhino-Laryngology, 281*(2), 985-993. doi:10.1007/s00405-023-08319-9

Chirag. (2024, September 13). NLP applications and their use cases for modern enterprises [Web log message]. Retrieved from https://appinventiv.com/blog/natural-language-processing-applications-for-business/

Chishti, M. Z. (2022). Analysis of the nexus between demographic changes and economic growth in Pakistan: Role of capital stock. *Iranian Economic Review, 26*(3), 489-510. doi:10.22059/ier.2022.89082

Chui, M., Hazan, E., Roberts, R., Singla, A., & Smaje, K. (2023). *The economic potential of generative AI*. Retrieved from https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-economic-potential-of-generative-ai-the-next-productivity-frontier#introduction

References (Cont.)

Cochran, W. G. (1977). *Sampling techniques* (3rd ed). New York: John Wiley & Sons.

Çolak, O. (2023). The impact of artificial intelligence on the employment structure of the tourism industry: An interview with ChatGPT. *Journal of Economics Business and Political Researches, 8*(22), 919-939. doi:10.25204/iktisad.1347642

Cox, C., & Tzoc, E. (2023). ChatGPT: Implications for academic libraries. *College & Research Libraries News, 84*(3), 99-102. doi:10.5860/crln.84.3.99

Correa, T., Straubhaar, J. D., Chen, W., & Spence, J. (2015). Brokering new technologies: The role of children in their parents' usage of the internet. *New Media & Society, 17*(4), 483-500. doi:10.1177/1461444813506975

Crain, P. (2023). *Demographic economics definition, factors & examples.* Retrieved from https://study.com/academy/lesson/demographic-economics-population.html

Crossler, R. E., Bélanger, F., & Ormond, D. (2019). The quest for complete security: An empirical analysis of users' multi-layered protection from security threats. *Information Systems Frontiers, 21*, 343-357. doi:10.1007/s10796-017-9755-1

Cruz-Cárdenas, J., Zabelina, E., Deyneka, O., Guadalupe-Lanas, J., & Velín-Fárez, M. (2019). Role of demographic factors, attitudes toward technology, and cultural values in the prediction of technology-based consumer behaviors: A study in developing and emerging countries. *Technological Forecasting and Social Change, 149*, 1-12. doi:10.1016/j.techfore.2019.119768

Cruz, M. D. (2023). Labor productivity, real wages, and employment in OECD economies. *Structural Change and Economic Dynamics, 66,* 367-382. doi:10.1016/j.strueco.2023.05.007

Czaja, S. J., Charness, N., Fisk, A. D., Hertzog, C., Nair, S. N., Rogers, W. A., & Sharit, J. (2006). Factors predicting the use of technology: Findings from the Center for Research and Education on Aging and Technology Enhancement (CREATE). *Psychology and Aging, 21*(2), 333-352. doi:10.1037/0882-7974.21.2.333

References (Cont.)

Danthine, J. P., & Kurmann, A. (2004). Fair wages in a New Keynesian model of the business cycle. *Review of Economic Dynamics, 7*(1), 107-142. doi:10.1016/j.red.2003.07.001

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319-340. doi:10.2307/249008

Dawadi, S., Shrestha, S., & Giri, R. A. (2021). Mixed-methods research: A discussion on its types, challenges, and criticisms. *Journal of Practical Studies in Education*, *2*(2), 25-36. doi:10.46809/jpse.v2i2.20

Demirciftci, T. (2024). Current issues on robots and self-service technology in responsible and creative tourism. In A. Alnoor, G. E. Bayram, C. XinYing, & S. H. A. Shah, (Eds.), *The Role of Artificial Intelligence in Regenerative Tourism and Green Destinations* (pp. 237-246). doi:10.1108/978-1-83753-746-420241015

Deng, J., & Lin, Y. (2022). The benefits and challenges of ChatGPT: An overview. *Frontiers in Computing and Intelligent Systems*, *2*(2), 81-83. doi:10.54097/fcis.v2i2.4465

Diamond, P. (2011). Unemployment, vacancies, wages. *American Economic Review, 101*(4), 1045-1072. doi:10.1257/aer.101.4.1045

Dogra, R. (2024). *Google rebrands AI chatbot Bard to Gemini.* Retrieved from https://www.aiworldtoday.net/p/google-rebrands-ai-chatbot-bard-to-gemini

Dollah, S., Abduh, A., & Rosmaladewi, M. (2017). Benefits and drawbacks of NVivo QSR application. In *2nd International Conference on Education, Science, and Technology (ICEST 2017)* (pp. 61-63). doi:10.2991/icest-17.2017.21

Elahi, M., Afolaranmi, S. O., Martinez Lastra, J. L., & Perez Garcia, J. A. (2023). A comprehensive literature review of the applications of AI techniques through the lifecycle of industrial equipment. *Discover Artificial Intelligence, 3*, 43. doi:10.1007/s44163-023-00089-x

References (Cont.)

Elder, G. H., Johnson, M. K., & Crosnoe, R. (2003). The emergence and development of life course theory. In J. T. Mortimer & M. J. Shanahan (Eds.), *Handbook of the life course* (pp. 3–19). doi:10.1007/978-0-306-48247-2_1

Faqih, K. M. (2022). Factors influencing the behavioral intention to adopt a technological innovation from a developing country context: The case of mobile augmented reality games. *Technology in Society, 69*, 1-21. doi:10.1016/j.techsoc.2022.101958

Farahani, M., & Ghasemi, G. (2024). Artificial intelligence and inequality: Challenges and opportunities. *Qeios*, 1-14. doi:10.32388/7HWUZ2

Fast, E., & Horvitz, E. (2017). Long-term trends in the public perception of artificial intelligence. *Proceedings of the AAAI Conference on Artificial Intelligence, 31*(1), 963-969. doi:10.1609/aaai.v31i1.10635

Foroughi, B., Iranmanesh, M., Kuppusamy, M., Ganesan, Y., Ghobakhloo, M., & Senali, M. G. (2023). Determinants of continuance intention to use gamification applications for task management: An extension of technology continuance theory. *The Electronic Library, 41*(2/3), 286-307. doi:10.1108/EL-05-2022-0108

Fraccastoro, S., Gabrielsson, M., & Pullins, E. B. (2021). The integrated use of social media, digital, and traditional communication tools in the B2B sales process of international SMEs. *International Business Review, 30*(4), 1-15. doi:10.1016/j.ibusrev.2020.101776

Frankenfield, J., Clemon, D., & Li, T. (2021). *Natural language processing (NLP): What it means, how it works.* Retrieved from https://www.investopedia.com/ terms/n/natural-language-processing-nlp.asp

Frankenfield, J., & Scott, G. (2023). *Artificial intelligence (AI): What it is and how it is used.* Retrieved from https://www.investopedia.com/ terms/a/artificial-intelligence-ai.asp

References (Cont.)

Frey, C. B., & Osborne, M. A. (2017). The future of employment: How susceptible are jobs to computerisation?. *Technological Forecasting and Social Change*, *114*, 254-280. doi:10.1016/j.techfore.2016.08.019

Geissinger, A., Laurell, C., Öberg, C., & Sandström, C. (2023). Social media analytics for innovation management research: A systematic literature review and future research agenda. *Technovation*, *123*, 1-18. doi:10.1016/j.technovation.2023.102712

Gemini. (2024). *Gemini App*. Retrieved from https://gemini.google.com/app

George, S., & George, H. (2023). A review of ChatGPT AI's impact on several business sectors. *Partners Universal International Innovation Journal*, *1*(1), 9-23. Retrieved from https://puiij.com/index.php/research/article/view/11

Ghorbanzadeh, D., & Rahehagh, A. (2021). Emotional brand attachment and brand love: The emotional bridges in the process of transition from satisfaction to loyalty. *Rajagiri Management Journal*, *15*(1), 16-38. doi:10.1108/RAMJ-05-2020-0024

Girme, Y. U., Park, Y., & MacDonald, G. (2023). Coping or thriving? Reviewing intrapersonal, interpersonal, and societal factors associated with well-being in singlehood from a within-group perspective. *Perspectives on Psychological Science*, *18*(5), 1097-1120. doi:10.1177/17456916221136119

Global Hola. (2024). *The rise of Gemini: Will AI outperform humans in the job market?*. Retrieved from https://globalhola.com/blog/the-rise-of-gemini-will-ai-outperform-humans-in-the-job-market/

Gnambs, T., & Appel, M. (2019). Are robots becoming unpopular? Changes in attitudes towards autonomous robotic systems in Europe. *Computers in Human Behavior*, *93*, 53-61. doi:10.1016/j.chb.2018.11.045

References (Cont.)

Górriz, J. M., Ramírez, J., Ortíz, A., Martinez-Murcia, F. J., Segovia, F., Suckling, J., … Bonomini, P. (2020). Artificial intelligence within the interplay between natural and artificial computation: Advances in data science, trends and applications. *Neurocomputing, 410*, 237-270. doi:10.1016/j.neucom.2020.05.078

Graham-Smith, D. (2023). *What is generative AI?*. Retrieved from https://www.techfinitive.com/explainers/what-is-generative-ai/

Grainca, B. (2022). Methodological basis of unemployment. *International Journal of Social, Political and Economic Research*, *9*(1), 163-183. doi:10.46291/IJOSPERvol9iss1pp163-183

Granić, A. (2024). Technology adoption at individual level: Toward an integrated overview. *Universal Access in the Information Society*, *23*(2), 843-858. doi:10.1007/s10209-023-00974-3

Grant, N., & Metz, C. (2023, March 21). Google releases Bard, its competitor in the race to create A.I. chatbots. *The New York Times*. Retrieved from https://www.nytimes.com/2023/03/21/technology/google-bard-chatbot.html

Guerrazzi, M., & Meccheri, N. (2012). From wage rigidity to labour market institution rigidity: A turning-point in explaining unemployment?. *The Journal of Socio-Economics*, *41*(2), 189-197. doi:10.1016/j.socec.2011.12.001

Guliyev, H. (2023). Artificial intelligence and unemployment in high-tech developed countries: New insights from dynamic panel data model. *Research in Globalization*, *7,* 1-7. doi:10.1016/j.resglo.2023.100140

Guo, Q., Zhu, D., Lin, M. T., Li, F., Kim, P. B., Du, D., & Shu, Y. (2023). Hospitality employees' technology adoption at the workplace: Evidence from a meta-analysis. *International Journal of Contemporary Hospitality Management, 35*(7), 2437-2464. doi:10.1108/IJCHM-06-2022-0701

Gupta, B., Mufti, T., Sohail, S. S., & Madsen, D. (2023). ChatGPT: A brief narrative review. *Cogent Business & Management*, *10*(3), 2275851. doi:10.1080/23311975.2023.2275851

References (Cont.)

Gupta, R., Nair, K., Mishra, M., Ibrahim, B., & Bhardwaj, S. (2024). Adoption and impacts of generative artificial intelligence: Theoretical underpinnings and research agenda. *International Journal of Information Management Data Insights*, *4*(1), 1-15. doi:10.1016/j.jjimei.2024.100232

Hallal, K., Hamdan, R., & Tlais, S. (2023). Exploring the potential of AI-Chatbots in organic chemistry: An assessment of ChatGPT and Bard. *Computers and Education: Artificial Intelligence*, *5*, 1-8. doi:10.1016/j.caeai.2023.100170

Han, L., & Siau, K. (2020). *Impact of socioeconomic status on trust in artificial intelligence*. Retrieved from https://aisel.aisnet.org/treos_amcis2020/90

Harrison, R. L., Reilly, T. M., & Creswell, J. W. (2020). Methodological rigor in mixed methods: An application in management studies. *Journal of Mixed Methods Research*, *14*(4), 473-495. doi:10.1177/1558689819900585

Hassani, H., & Silva, E. S. (2023). The role of ChatGPT in data science: How AI-assisted conversational interfaces are revolutionizing the field. *Big Data and Cognitive Computing*, *7*(2), 1-16. doi:10.3390/bdcc7020062

Hau, H. T., Nhung, D. T. H., & Trang, P. H. (2021). An empirical analysis of factors affecting the intention of using digital wallets in Vietnam. *Journal of International Economics and Management*, *21*(1), 86-107. doi:10.38203/jiem.021.1.0024

Hayes, A., Potters, C., & Beer, K. (2023). *Demographics: How to collect, analyze, and use demographic data*. Retrieved from https://www.investopedia.com/terms/d/demographics.asp

Hennink, M., & Kaiser, B. N. (2022). Sample sizes for saturation in qualitative research: A systematic review of empirical tests. *Social Science & Medicine*, *292*, 1-10. doi:10.1016/j.socscimed.2021.114523

Hilal, A. H., & Alabri, S. S. (2013). Using NVivo for data analysis in qualitative research. *International Interdisciplinary Journal of Education*, *2*(2), 181-186. Retrieved from https://iijoe.org/v2/IIJOE_06_02_02_2013.pdf

References (Cont.)

Hoang, H., & Tan, T. L. (2023). Unveiling digital transformation: Investigating technology adoption in Vietnam's food delivery industry for enhanced customer experience. *Heliyon*, *9*(9), 1-20. doi:10.1016/j.heliyon.2023.e19719

Hojnik, J., Ruzzier, M., Ruzzier, M. K., Sučić, B., & Soltwisch, B. (2023). Challenges of demographic changes and digitalization on eco-innovation and the circular economy: Qualitative insights from companies. *Journal of Cleaner Production*, *396*, 1-9. doi:10.1016/j.jclepro.2023.136439

Holland, B. J. (2023). ChatGPT 3.5 and 4; Its ramifications on librarianship, academia, education, publishing, and the workplace. In *Handbook of Research on Advancements of Contactless Technology and Service Innovation in Library and Information Science* (pp. 316-340). doi:10.4018/978-1-6684-7693-2.ch016

Holmes, W., Porayska-Pomsta, K., Holstein, K., Sutherland, E., Baker, T., Shum, S. B., … Koedinger, K. R. (2022). Ethics of AI in education: Towards a community-wide framework. *International Journal of Artificial Intelligence in Education*, *32*, 504-526. doi:10.1007/s40593-021-00239-1

Holstein, K., McLaren, B. M., & Aleven, V. (2019). Co-designing a real-time classroom orchestration tool to support teacher–AI complementarity. *Journal of Learning Analytics*, *6*(2), 27-52. doi:10.18608/jla.2019.62.3

Homolak, J. (2023). Opportunities and risks of ChatGPT in medicine, science, and academic publishing: A modern promethean dilemma. *Croatian Medical Journal*, *64*(1), 1-3. doi:10.3325/cmj.2023.64.1

Horodyski, P. (2023). Applicants' perception of artificial intelligence in the recruitment process. *Computers in Human Behavior Reports*, *11*, 1-8. doi:10.1016/j.chbr.2023.100303

Hsiao, S. (2024, February 8). Bard becomes Gemini: Try Ultra 1.0 and a new mobile app today [Web log message]. Retrieved from https://blog.google/products/gemini/bard-gemini-advanced-app/

References (Cont.)

Huawei Technologies Co., Ltd. (2022). A General Introduction to Artificial Intelligence. In *Artificial Intelligence Technology* (pp. 1-41). Singapore: Springer Nature Singapore. doi:10.1007/978-981-19-2879-6_1

Igbokwe, I. C. (2023). Application of artificial intelligence (AI) in educational management. *International Journal of Scientific and Research Publications, 13*(3), 300-307. doi:10.29322/IJSRP.13.03.2023.p13536

Imamguluyev, R. (2023). The rise of GPT-3: Implications for Natural Language Processing and beyond. *International Journal of Research Publication and Reviews*, *4*(3), 4893-4903. doi:10.55248/gengpi.2023.4.33987

Jacob, C., Sezgin, E., Sanchez-Vazquez, A., & Ivory, C. (2022). Sociotechnical factors affecting patients' adoption of mobile health tools: Systematic literature review and narrative synthesis. *JMIR mHealth and uHealth*, *10*(5), 1-27. doi:10.2196/36284

Jaiswal, A., Arun, C. J., & Varma, A. (2021). Rebooting employees: Upskilling for artificial intelligence in multinational corporations. *The International Journal of Human Resource Management*, *33*(6), 1179-1208. doi:10.1080/09585192.2021.1891114

Jangjarat, K., Kraiwanit, T., Limna, P., & Sonsuphap, R. (2023). Public perceptions towards ChatGPT as the Robo-Assistant. *Online Journal of Communication and Media Technologies*, *13*(3), 1-14. doi:10.30935/ojcmt/13366

Javaid, M., Haleem, A., Singh, R. P., & Suman, R. (2021). Substantial capabilities of robotics in enhancing industry 4.0 implementation. *Cognitive Robotics, 1*, 58-75. doi:10.1016/j.cogr.2021.06.001

Jenkins, Z. (2024). *Google AI Chatbot Bard | Features, applications, and updates.* Retrieved from https://edrawmax.wondershare.com/ai-tools-tips/ai-chatbot.html#

Jin, X., & Xu, F. (2021). Examining the factors influencing user satisfaction and loyalty on paid knowledge platforms. *Aslib Journal of Information Management*, *73*(2), 254-270. doi:10.1108/AJIM-07-2020-0228

References (Cont.)

Jo, C., Kim, D. H., & Lee, J. W. (2023). Forecasting unemployment and employment: A system dynamics approach. *Technological Forecasting and Social Change, 194*, 1-9. doi:10.1016/j.techfore.2023.122715

Jo, H., & Park, D. H. (2023). Affordance, usefulness, enjoyment, and aesthetics in sustaining virtual reality engagement. *Scientific Reports, 13*(1), 1-16. doi:10.1038/s41598-023-42113-1

Joo, Y. J., Park, S., & Shin, E. K. (2017). Students' expectation, satisfaction, and continuance intention to use digital textbooks. *Computers in Human Behavior, 69*, 83-90. doi:10.1016/j.chb.2016.12.025

Kabir, O. (2023). *Google goes on the AI offensive with a new and improved Bard.* Retrieved from https://www.calcalistech.com/ctechnews/article/ skb0011srnn

Kalyan, K. S. (2023). A survey of GPT-3 family large language models including ChatGPT and GPT-4. *Natural Language Processing Journal, 6*, 1-48. doi:10.1016/j.nlp.2023.100048

Kamalov, F., Calonge, D. S., & Gurrib, I. (2023). New era of artificial intelligence in education: Towards a sustainable multifaceted revolution. *Sustainability, 15*(16), 1-27. doi:10.3390/su151612451

Kanade, V. (2022). *What is artificial intelligence (AI)? Definition, types, goals, challenges, and trends in 2022.* Retrieved from https://www.spiceworks.com/ tech/artificial-intelligence/articles/what-is-ai/

Kaplan, A., & Haenlein, M. (2019). Siri, Siri, in my hand: Who's the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence. *Business Horizons, 62*(1), 15-25. doi:10.1016/j.bushor.2018.08.004

Karim, K., Ilyas, G. B., Umar, Z. A., Tajibu, M. J., & Junaidi, J. (2023). Consumers' awareness and loyalty in Indonesia banking sector: Does emotional bonding effect matters?. *Journal of Islamic Marketing, 14*(10), 2668-2686. doi:10.1108/JIMA-03-2022-0092

References (Cont.)

Kessler, G. (2018). Technology and the future of language teaching. *Foreign Language Annals, 51*(1), 205-218. doi:10.1111/flan.12318

Kelly, S., Kaye, S. A., & Oviedo-Trespalacios, O. (2023). What factors contribute to the acceptance of artificial intelligence? A systematic review. *Telematics and Informatics*, *77*, 1-33. doi:10.1016/j.tele.2022.101925

Khan, M. L. (2017). Social media engagement: What motivates user participation and consumption on YouTube?. *Computers in Human Behavior*, *66*, 236-247. doi:10.1016/j.chb.2016.09.024

Khoa, B. T., Hung, B. P., & Hejsalem-Brahmi, M. (2023). Qualitative research in social sciences: Data collection, data analysis and report writing. *International Journal of Public Sector Performance Management*, *12*(1-2), 187-209. doi:10.1504/IJPSPM.2023.132247

Khogali, H. O., & Mekid, S. (2023). The blended future of automation and AI: Examining some long-term societal and ethical impact features. *Technology in Society*, *73*, 1-12. doi:10.1016/j.techsoc.2023.102232

Kirschner, P. A., & De Bruyckere, P. (2017). The myths of the digital native and the multitasker. *Teaching and Teacher Education*, *67*, 135-142. doi:10.1016/j.tate.2017.06.001

Klug, D., Qin, Y., Evans, M., & Kaufman, G. (2021). Trick and please. A mixed-method study on user assumptions about the TikTok algorithm. *Proceedings of the 13th ACM Web Science Conference 2021*, 84-92. doi:10.1145/3447535.3462512

Koga, S., Martin, N. B., & Dickson, D. W. (2023). Evaluating the performance of large language models: ChatGPT and Google Bard in generating differential diagnoses in clinicopathological conferences of neurodegenerative disorders. *Brain Pathology*, 1-4. doi:10.1111/bpa.13207

Kolm, J. (2020). *Gen Z may not be as quick to adopt new technology*. Retrieved from https://strategyonline.ca/2020/01/30/gen-z-may-not-be-as-quick-to-adopt-new-technology/

References (Cont.)

Konger, S. (2023). *Let's introduce BARD AI: Google's new AI chatbot.* Retrieved from https://scientyficworld.org/googles-new-bard-ai/

Kraiwanit, T., Limna, P., Wattanasin, P., Asanprakit, S., & Thetlek, R. (2023). Adoption of Worldcoin digital wallet in Thailand. *Research in Globalization, 7*, 1-5. doi:10.1016/j.resglo.2023.100179

Kryńska, E., & Kopycińska, D. (2016). Wages in labour market theories. *Folia Oeconomica Stetinensia, 15*(2), 177-190. doi:10.1515/foli-2015-0044

Kulich, D., & Klubnikin, A. (2024). *Navigating generative AI trends for C-level executives.* Retrieved from https://itrexgroup.com/blog/generative-ai-trends/

Kurnia, P. R., & Sitio, R. P. (2023). Exploring the dynamics of pay later in e-commerce: Trust, security, satisfaction, and continuance intent. *International Journal of Digital Entrepreneurship and Business, 4*(2), 58-71. doi:10.52238/ideb.v4i2.109

Kwak, H., Lee, C., Park, H., & Moon, S. (2010). What is Twitter, a social network or a news media?. *Proceedings of the 19th International Conference on World Wide Web*, 591–600. doi:10.1145/1772690.1772751

Lawton, G. (2024). *What is generative AI? Everything you need to know.* Retrieved from https://www.techtarget.com/searchenterpriseai/definition/ generative-AI

Lee, J. C., Tang, Y., & Jiang, S. (2023). Understanding continuance intention of artificial intelligence (AI)-enabled mobile banking applications: an extension of AI characteristics to an expectation confirmation model. *Humanities and Social Sciences Communications, 10*(1), 1-12. doi:10.1057/s41599-023-01845-1

Lee, K. H. (2023). *The economics of Keynes and uncertainty in theory: Rediscovering common sense.* Retrieved from https://www.cambridgescholars.com/ resources/pdfs/978-1-5275-1860-5-sample.pdf

References (Cont.)

Leite, B. S. (2024). Generative artificial intelligence in chemistry teaching: ChatGPT, Gemini, and Copilot's content responses. *Journal of Applied Learning and Teaching, 7*(2), 1-15. doi:10.37074/jalt.2024.7.2.13

Liedtke, M. (2023). *Google brings its AI chatbot Bard into its inner circle, opening door to Gmail, Maps, YouTube.* Retrieved from https://techxplore.com/news/2023-09-google-ai-chatbot-bard-circle.html

Limna, P., & Kraiwanit, T. (2023). The role of ChatGPT on customer service in the hospitality industry: An exploratory study of hospitality workers' experiences and perceptions. *Tourism and Hospitality Management*, *29*(4), 583-592. doi:10.20867/thm.29.4.9

Lu, Y., Colak, A., & Zhang, J. (2022). What Motivates Tourists' Responsible Behavior? An Investigation Based on the Extensive Socialized Model of UTAUT. *Mathematical Problems in Engineering*, *2022*(1), 1-11. doi:10.1155/2022/1330332

Luckin, R., & Cukurova, M. (2019). Designing educational technologies in the age of AI: A learning sciences-driven approach. *British Journal of Educational Technology*, *50*(6), 2824-2838. doi:10.1111/bjet.12861

Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). *Intelligence unleashed: An argument for AI in education.* Retrieved from http://discovery.ucl.ac.uk/1475756/

Luo, A. (2018). *Content analysis Guide, methods & examples.* Retrieved from https://www.scribbr.com/methodology/content-analysis/

Lybeck, R., Koiranen, I., & Koivula, A. (2024). From digital divide to digital capital: the role of education and digital skills in social media participation. *Universal Access in the Information Society*, *23*(4), 1657-1669. doi:10.1007/s10209-022-00961-0

References (Cont.)

Maduku, D. K., & Thusi, P. (2023). Understanding consumers' mobile shopping continuance intention: New perspectives from South Africa. *Journal of Retailing and Consumer Services*, *70*, 1-19. doi:10.1016/j.jretconser.2022.103185

Mah, P. M., Skalna, I., & Muzam, J. (2022). Natural language processing and artificial intelligence for enterprise management in the era of industry 4.0. *Applied Sciences*, *12*(18), 1-26. doi:10.3390/app12189207

Makridakis, S. (2017). The forthcoming artificial intelligence (AI) revolution: Its impact on society and firms. *Futures*, *90*, 46-60. doi:10.1016/j.futures.2017.03.006

Manyika, J., & Hsiao, S. (2023). *An overview of Bard: an early experiment with generative AI.* Retrieved from https://ai.google/static/documents/google-about-bard.pdf

Masao, M., & Salehudin, I. (2023). Unveiling the dynamics of expectation, flow, enjoyment, and satisfaction: Drivers of continued subscription intentions among Netflix users. *The South East Asian Journal of Management*, *17*(2), 96-121. doi:10.21002/seam.v17i2.1410

Mason, T. (2023). Qualitative research techniques for language models: Conducting semi-structured conversations with ChatGPT and Bard in computer science education. *Infotech Journal Scientific and Academic*, *4*(1), 219-243. Retrieved from https://infotechjournal.org/index.php/infotech/article/view/27

Master, A., Cheryan, S., & Meltzoff, A. N. (2016). Computing whether she belongs: Stereotypes undermine girls' interest and sense of belonging in computer science. *Journal of Educational Psychology*, *108*(3), 424-437. Retrieved from https://psycnet.apa.org/buy/2015-37516-001

McCarthy, J., Minsky, M. L., Rochester, N., & Shannon, C. E. (2006). A proposal for the Dartmouth summer research project on artificial intelligence. *AI Magazine*, *27*(4), 12-14. doi:10.1609/aimag.v27i4.1904

References (Cont.)

Mishra, A., Shukla, A., Rana, N. P., Currie, W. L., & Dwivedi, Y. K. (2023). Re-examining post-acceptance model of information systems continuance: A revised theoretical model using MASEM approach. *International Journal of Information Management*, *68*, 1-13. doi:10.1016/j.ijinfomgt.2022.102571

Mohajan, H. K. (2018). Qualitative research methodology in social sciences and related subjects. *Journal of Economic Development, Environment and People*, *7*(1), 23-48. Retrieved from https://mpra.ub.uni-muenchen.de/85654/

Mohajan, H. K. (2020). Quantitative research: A successful investigation in natural and social sciences. *Journal of Economic Development, Environment and People*, *9*(4), 50-79. Retrieved from https://mpra.ub.uni-muenchen. de/105149/

Morandini, S., Fraboni, F., De Angelis, M., Puzzo, G., Giusino, D., & Pietrantoni, L. (2023). The impact of artificial intelligence on workers' skills: Upskilling and reskilling in organisations. *Informing Science*, *26*, 39-68. doi:10.28945/5078

Mortelmans, D. (2019). Analyzing qualitative data using NVivo. In *The Palgrave Handbook of Methods for Media Policy Research* (pp. 435-450). doi:10.1007/978-3-030-16065-4_25

Muhammad, S. S., Dey, B. L., Kamal, M. M., & Alwi, S. F. S. (2021). Consumer engagement with social media platforms: A study of the influence of attitudinal components on cutting edge technology adaptation behaviour. *Computers in Human Behavior*, *121*, 1-27. doi:10.1016/j.chb.2021.106802

Mukhamediev, R. I., Popova, Y., Kuchin, Y., Zaitseva, E., Kalimoldayev, A., Symagulov, A., … Muhamedijeva, E. (2022). Review of artificial intelligence and machine learning technologies: Classification, restrictions, opportunities and challenges. *Mathematics*, *10*(15), 1-25. doi:10.3390/math10152552

Mulisa, F. (2022). When does a researcher choose a quantitative, qualitative, or mixed research approach?. *Interchange*, *53*(1), 113-131. doi:10.1007/s10780-021-09447-z

References (Cont.)

Müller, V. C., & Bostrom, N. (2016). Future progress in artificial intelligence: A survey of expert opinion. *Fundamental issues of artificial intelligence,* 555-572. doi:10.1007/978-3-319-26485-1_33

Mutascu, M. (2021). Artificial intelligence and unemployment: New insights. *Economic Analysis and Policy, 69*, 653-667. doi:10.1016/j.eap.2021.01.012

Nasir, S., & Avunduk, Z. B. (2011). The evolution and transformation of higher education: A content analysis of articles published in Journal of Higher Education. In *International Higher Education Congress: New Trends and Issues* (pp. 395-403). Retrieved from https://www.researchgate.net/publication/309428333

Nedelkoska, L., & Quintini, G. (2018). *Automation, skills use and training* (OECD Social, Employment and Migration Working Papers, No. 202). doi:10.1787/2e2f4eea-en

Nessim, H., & Wozniak, R. (2001). *Consumer behavior: An applied approach*. Retrieved from https://www.worldcat.org/title/42428750

Niehaves, B., & Plattfaut, R. (2014). Internet adoption by the elderly: Employing IS technology acceptance theories for understanding the age-related digital divide. *European Journal of Information Systems, 23*(6), 708-726. doi:10.1057/ejis.2013.19

Nilsson, N. J. (2011). *The quest for artificial intelligence: A history of ideas and achievements.* USA: Cambridge University Press. doi:10.1017/CBO9780511819346

Nuseir, M. T., Aljumah, A. I., El Refae, G., Awawdeh, A. E., Baadhem, A. M., & Urabi, S. (2023). The role of social media usage, E-WOM, and perceived enjoyment in shaping customer attitudes and blockchain adoption loyalty in UAE banking: A quantitative investigation. In *2023 International Conference on Intelligent Computing, Communication, Networking and Services (ICCNS)* (pp. 141-148). doi:10.1109/ICCNS58795.2023.10193614

References (Cont.)

Obilor, E. I. (2023). Convenience and purposive sampling techniques: Are they the same. *International Journal of Innovative Social & Science Education Research, 11*(1), 1-7. Retrieved from https://seahipaj.org/journals-ci/mar-2023/IJISSER/full/IJISSER-M-1-2023.pdf

Ooi, K. B., Tan, G. W. H., Al-Emran, M., Al-Sharafi, M. A., Capatina, A., Chakraborty, A., … Wong, L. W. (2023). The potential of generative artificial intelligence across disciplines: Perspectives and future directions. *Journal of Computer Information Systems*, 1-32. doi:10.1080/08874417.2023.2261010

Panda, P. R., Sahoo, S. M., Das, S., Bansal, R., Dey, S., Kanwal, N. D., & Badawy, H. R. (2024). A conceptual study on Instagram marketing: Examining the effect of AI on several business sectors using AI ChatGPT on marketing effectiveness. In S. Dadwal, S. Goyal, P. Kumar, & R. Verma (Eds.), *Demystifying the Dark Side of AI in Business* (pp. 20-43). doi:10.4018/979-8-3693-0724-3.ch002

Perazzoli, S., de Santana Neto, J. P., & de Menezes, M. J. M. B. (2022). Systematic analysis of constellation-based techniques by using Natural Language Processing. *Technological Forecasting and Social Change, 179*, 121674. doi:10.1016/j.techfore.2022.121674

Pereira, R., & Tam, C. (2021). Impact of enjoyment on the usage continuance intention of video-on-demand services. *Information & Management, 58*(7), 1-16. doi:10.1016/j.im.2021.103501

Peters, D., Calvo, R. A., & Ryan, R. M. (2018). Designing for motivation, engagement and wellbeing in digital experience. *Frontiers in Psychology, 9*, 1-15. doi:10.3389/fpsyg.2018.00797

Perrin, A., & Anderson, M. (2019). *Share of U.S. adults using social media, including Facebook, is mostly unchanged since 2018.* Retrieved from https://www.pewresearch.org/short-reads/2019/04/10/share-of-u-s-adults-using-social-media-including-facebook-is-mostly-unchanged-since-2018/

References (Cont.)

Pichai, S. (2024, February 8). The next chapter of our Gemini era [Web log message]. Retrieved from https://blog.google/technology/ai/google-gemini-update-sundar-pichai-2024/

Pichai, S., & Hassabis, D. (2023, December 6). Introducing Gemini: Our largest and most capable AI model [Web log message]. Retrieved from https://blog.google/technology/ai/google-gemini-ai/

Pichai, S., & Hassabis, D. (2024, February 15). Our next-generation model: Gemini 1.5. [Web log message]. Retrieved from https://blog.google/technology/ai/google-gemini-next-generation-model-february-2024/#sundar-note

Plevris, V., Papazafeiropoulos, G., & Rios, A. J. (2023). Chatbots put to the test in math and logic problems: A comparison and assessment of ChatGPT-3.5, ChatGPT-4, and Google Bard. *AI, 4*(4), 949-969. doi:10.3390/ai4040048

Prasetyo, P. E., & Cahyani, E. N. (2022). Investigating Keynesian theory in reducing unemployment and poverty in Indonesia. *The Journal of Asian Finance, Economics and Business, 9*(10), 39-48. doi:10.13106/JAFEB.2022.VOL9.NO10.0039

Prensky, M. (2001). Digital natives, digital immigrants part 1. *On the Horizon, 9*(5), 1-6. doi:10.1108/10748120110424816

PricewaterhouseCoopers. (2018). *The macroeconomic impacts of artificial intelligence.* Retrieved from https://www.pwc.co.uk/economic-services/assets/macroeconomic-impact-of-ai-technical-report-feb-18.pdf

Probasco, J., Smith, A., & Velasquez, V. (2023). *Generative AI and its economic impact: What you need to know.* Retrieved from https://www.investopedia.com/economic-impact-of-generative-ai-7976252

Purnama, Y., & Asdlori, A. (2023). The role of social media in students' social perception and interaction: Implications for learning and education. *Technology and Society Perspectives, 1*(2), 45-55. doi:10.61100/tacit.v1i2.50

References (Cont.)

Qarajeh, A., Tangpanithandee, S., Thongprayoon, C., Suppadungsuk, S., Krisanapan, P., Aiumtrakul, N., … Cheungpasitporn, W. (2023). AI-powered renal diet support: Performance of ChatGPT, Bard AI, and Bing Chat. *Clinics and Practice*, *13*(5), 1160-1172. doi:10.3390/clinpract13050104

Qin, C., Zhang, A., Zhang, Z., Chen, J., Yasunaga, M., & Yang, D. (2023). Is ChatGPT a general-purpose natural language processing task solver?. *arXiv*, 1-46. doi:10.48550/arXiv.2302.06476

Qin, H., Ji, G. P., Khan, S., Fan, D. P., Khan, F. S., & Van Gool, L. (2023). How good is Google Bard′ s visual understanding? An empirical study on open challenges. *Machine Intelligence Research*, *20*(5), 605-613. doi:10.1007/s11633-023-1469-x

Rainie, L., & Anderson, J. (2017). *The future of jobs and jobs training.* Retrieved from https://www.pewresearch.org/internet /2017/05/03/the-future-of-jobs-and-jobs-training

Rane, N. (2024). Role and challenges of ChatGPT, Gemini, and similar generative artificial intelligence in human resource management. *Studies in Economics and Business Relations*, *5*(1), 11-23. doi:10.48185/sebr.v5i1.1001

Ray, P. P. (2023). ChatGPT: A comprehensive review on background, applications, key challenges, bias, ethics, limitations and future scope. *Internet of Things and Cyber-Physical Systems*, *3*, 121-154. doi:10.1016/j.iotcps.2023.04.003

Reiff, N., & Velasquez, V. (2023). *What is ChatGPT, and how does it make money?.* Retrieved from https://www.investopedia.com/what-is-chatgpt-7094342

Resume Builder. (2023). *1 in 4 companies have already replaced workers with ChatGPT.* Retrieved from https://www.resumebuilder.com/1-in-4-companies-have-already-replaced-workers-with-chatgpt/

Riddell, W. C., & Song, X. (2017). The role of education in technology use and adoption: Evidence from the Canadian workplace and employee survey. *ILR Review*, *70*(5), 1219-1253. doi:10.1177/0019793916687719

References (Cont.)

Rodway, P., & Schepman, A. (2023). The impact of adopting AI educational technologies on projected course satisfaction in university students. *Computers and Education: Artificial Intelligence*, *5*, 1-12. doi:10.1016/j.caeai.2023.100150

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Retrieved from https://search.worldcat.org/title/Diffusion-of-innovations/oclc/52030797

Rojas-Mendez, J. I., Parasuraman, A., & Papadopoulos, N. (2017). Demographics, attitudes, and technology readiness: A cross-cultural analysis and model validation. *Marketing Intelligence & Planning*, *35*(1), 18-39. doi:10.1108/MIP-08-2015-0163

Rovinelli, R. J., & Hambleton, R. K. (1976). *On the use of content specialists in the assessment of criterion-referenced test item validity*. Retrieved from ERIC database. (ED121845)

Roumeliotis, K. I., & Tselikas, N. D. (2023). ChatGPT and Open-AI models: A preliminary review. *Future Internet*, *15*(6), 1-24. doi:10.3390/fi15060192

Rudolph, J., Tan, S., & Tan, S. (2023). War of the chatbots: Bard, Bing Chat, ChatGPT, Ernie and beyond. The new AI gold rush and its impact on higher education. *Journal of Applied Learning and Teaching*, *6*(1), 364-389. doi:10.37074/jalt.2023.6.1.23

Rutakumwa, R., Mugisha, J. O., Bernays, S., Kabunga, E., Tumwekwase, G., Mbonye, M., & Seeley, J. (2020). Conducting in-depth interviews with and without voice recorders: A comparative analysis. *Qualitative Research*, *20*(5), 565-581. doi:10.1177/1468794119884806

Saleh, S. S., Nat, M., & Aqel, M. (2022). Sustainable adoption of e-learning from the TAM perspective. *Sustainability*, *14*(6), 1-19. doi:10.3390/su14063690

Sardana, D., Fagan, T. R., & Wright, J. T. (2023). ChatGPT: A disruptive innovation or disrupting innovation in academia?. *The Journal of the American Dental Association*, *154*(5), 361-364. doi:10.1016/j.adaj.2023.02.008

References (Cont.)

Sarker, I. H. (2022). Ai-based modeling: Techniques, applications and research issues towards automation, intelligent and smart systems. *SN Computer Science, 3*(2), 1-20. doi:10.1007/s42979-022-01043-x

Sarwar, B., Sarwar, A., Mugahed Al-Rahmi, W., Almogren, A. S., Salloum, S., & Habes, M. (2023). Social media paradox: Utilizing social media technology for creating better value for better social outcomes: Case of developing countries. *Cogent Business & Management, 10*(2), 1-17. doi:10.1080/23311975.2023.2210888

Sathar, M. B. A., Rajagopalan, M., Naina, S. M., & Parayitam, S. (2023). A moderated-mediation model of perceived enjoyment, security and trust on customer satisfaction: Evidence from banking industry in India. *Journal of Asia Business Studies*, *17*(3), 656-679. doi:10.1108/JABS-03-2022-0089

Sayers, D., Sousa-Silva, R., Höhn, S., Ahmedi, L., Allkivi-Metsoja, K., Anastasiou, D., … Yayilgan, S. Y. (2021). *The dawn of the human-machine era: A forecast of new and emerging language technologies*. Retrieved from https://hal.science/hal-03230287/

Scheerder, A., Van Deursen, A., & Van Dijk, J. (2017). Determinants of Internet skills, uses and outcomes. A systematic review of the second-and third-level digital divide. *Telematics and informatics*, *34*(8), 1607-1624. doi:10.1016/j.tele.2017.07.007

Siad, S. M. (2023). The promise and perils of Google's Bard for scientific research. *Humanities Commons*, 1-5. doi:10.17613/yb4n-mc79

Sobieszek, A., & Price, T. (2022). Playing games with AIs: The limits of GPT-3 and similar large language models. *Minds and Machines*, *32*(2), 341-364. doi:10.1007/s11023-022-09602-0

Steinschaden, J. (2024). *Google Gemini vs. ChatGPT Plus vs. Microsoft Copilot.* Retrieved from https://www.trendingtopics.eu/google-gemini-vs-chatgpt-plus-vs-microsoft-copilot-2/

References (Cont.)

Stone, P., Brooks, R., Brynjolfsson, E., Calo, R., Etzioni, O., Hager, G., … Teller, A. (2016). *Artificial intelligence and life in 2030, One hundred year study on artificial intelligence: Report of the 2015-2016 study panel.* Retrieved from https://ai100.stanford.edu/2016-report

Suebtimrat, P., & Vonguai, R. (2021). An investigation of behavioral intention towards QR code payment in Bangkok, Thailand. *The Journal of Asian Finance, Economics and Business*, *8*(1), 939-950. doi:10.13106/jafeb.2021.vol8.no1.939

Suherlan, S., & Okombo, M. O. (2023). Technological innovation in marketing and its effect on consumer behaviour. *Technology and Society Perspectives*, *1*(2), 94-103. doi:10.61100/tacit.v1i2.57

Sukmawati, S., Salmia, S., & Sudarmin, S. (2023). Population, sample (quantitative) and selection of participants/key informants (qualitative). *Edumaspul: Jurnal Pendidikan*, *7*(1), 131-140. Retrieved from https://ummaspul.e-journal.id/maspuljr/article/view/5259

Sullivan, M., Kelly, A., & McLaughlan, P. (2023). ChatGPT in higher education: Considerations for academic integrity and student learning. *Journal of Applied Learning and Teaching*, *6*(1), 31-40. doi:10.37074/jalt.2023.6.1.17

Sumakul, D. T. Y. G., Hamied, F. A., & Sukyadi, D. (2022). Artificial intelligence in EFL classrooms: Friend or foe?. *LEARN Journal: Language Education and Acquisition Research Network, 15*(1), 232-256. Retrieved from https://so04.tci-thaijo.org/index.php/LEARN/article/view/256723

Suntigul, P. (2023). The Keynesian welfare state. *Romphruek Journal*, *41*(3), 273-292. Retrieved from https://so05.tci-thaijo.org/index.php/romphruekj/article/view/263072

Swain, J., & King, B. (2022). Using informal conversations in qualitative research. *International Journal of Qualitative Methods*, *21*, 1-10. doi:10.1177/16094069221085056

References (Cont.)

Szczepanski, M. (2019). *Economic impacts of artificial intelligence (AI).* Retrieved from https://www.europarl.europa.eu/thinktank/en/document/EPRS _BRI(2019)637967

Taherdoost, H. (2021). Data collection methods and tools for research; A step-by-step guide to choose data collection technique for academic and business research projects. *International Journal of Academic Research in Management*, *10*(1), 10-38. Retrieved from https://hal.science/hal-03741847/

Tan, P. J. B. (2013). Applying the UTAUT to understand factors affecting the use of English e-learning websites in Taiwan. *Sage Open*, *3*(4), 1-12. doi:10.1177/2158244013503837

Tandon, A., Dhir, A., Almugren, I., AlNemer, G. N., & Mäntymäki, M. (2021). Fear of missing out (FoMO) among social media users: A systematic literature review, synthesis and framework for future research. *Internet Research, 31*(3), 782-821. doi:10.1108/INTR-11-2019-0455

Tariq, A. (2022, September 8). Natural Language Processing: A comprehensive guide to its applications and more [Web log message]. Retrieved from https://datasciencedojo.com/blog/natural-language-processing-applications/

Teubner, T., Flath, C. M., Weinhardt, C., van der Aalst, W., & Hinz, O. (2023). Welcome to the era of ChatGPT et al. the prospects of large language models. *Business & Information Systems Engineering*, *65*(2), 95-101. doi:10.1007/s12599-023-00795-x

Theocharis, Y., & Lowe, W. (2015). Does Facebook increase political participation? Evidence from a field experiment. *Information, Communication & Society, 19*(10), 1465-1486. doi:10.1080/1369118X.2015.1119871

Tiplerlerd, P. (2015). *Factors influencing consumers' purchasing decision from traditional trade in the Bangkok metropolitan area* (Independent Study). Retrieved from https://ethesisarchive.library.tu.ac.th/ thesis/2015/ TU_2015_5702030569_3570_1985.pdf

References (Cont.)

Treviso, M., Lee, J. U., Ji, T., Aken, B. V., Cao, Q., Ciosici, M. R., … Martins, P. H. (2023). Efficient methods for natural language processing: A survey. *Transactions of the Association for Computational Linguistics, 11*, 826-860. doi:10.1162/tacl_a_00577

Truong, T. C., & Diep, Q. B. (2023). Technological spotlights of digital transformation in tertiary education. *IEEE Access, 11*, 40954-40966. doi:10.1109/ACCESS.2023.3270340

Tuzovic, S. (2022). *Talk to me – The rise of voice assistants and smart speakers: a balance between efficiency and privacy*. London: Sage Publications Ltd.

Vahdat, A., Alizadeh, A., Quach, S., & Hamelin, N. (2021). Would you like to shop via mobile app technology? The technology acceptance model, social factors and purchase intention. *Australasian Marketing Journal, 29*(2), 187-197. doi:10.1016/j.ausmj.2020.01.002

van Deursen, A. J. A. M., & van Dijk, J. A. G. M. (2015). Toward a multifaceted model of Internet access for understanding digital divides: An empirical investigation. *The Information Society, 31*(5), 379-391. doi:10.1080/01972243.2015.1069770

Vemprala, S., Bonatti, R., Bucker, A., & Kapoor, A. (2023). *ChatGPT for robotics: Design principles and model abilities.* Retrieved from https://www.microsoft.com/en-us/research/group/autonomous-systems-group-robotics/articles/chatgpt-for-robotics/

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science, 46*(2), 186-204. doi:10.1287/mnsc.46.2.186.11926

Venkatesh, V., & Morris, M. G. (2000). Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. *MIS Quarterly, 24*(1), 115-139. doi:10.2307/3250981

References (Cont.)

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, *27*(3), 425-478. doi:10.2307/30036540

Vogels, E. A. (2019). *Millennials stand out for their technology use, but older generations also embrace digital life.* Retrieved from https://www.pewresearch.org/short-reads/2019/09/09/us-generations-technology-use/

Wadhwani, S. (2023). *Google Launches Bard to catch up with ChatGPT and Microsoft.* Retrieved from https://www.spiceworks.com/tech/artificial-intelligence/news/google-bard-launch/

Waisberg, E., Ong, J., Masalkhi, M., Zaman, N., Sarker, P., Lee, A. G., & Tavakkoli, A. (2023). Google's AI chatbot Bard: A side-by-side comparison with ChatGPT and its utilization in ophthalmology. *Eye*, 1-4. doi:10.1038/s41433-023-02760-0

Wang, M. H. (2016). Factors influencing usage of e-learning systems in Taiwan's public sector: Applying the UTAUT model. *Advances in Management and Applied Economics, 6*(6), 63-82. Retrieved from https://www.scienpress.com/Upload/AMAE/Vol%206_6_5.pdf

Wang, C., Ahmad, S. F., Ayassrah, A. Y. B. A., Awwad, E. M., Irshad, M., Ali, Y. A., … Han, H. (2023). An empirical evaluation of technology acceptance model for artificial intelligence in e-commerce. *Heliyon*, *9*(8), 1-20. doi:10.1016/j.heliyon.2023.e18349

West, D. M. (2019). *The future of work: Robots, AI, and automation*. Retrieved from https://www.brookings.edu/book/the-automated-society/

Wodecki, B. (2023). *ChatGPT for business coming soon, says OpenAI.* Retrieved from https://aibusiness.com/nlp/chatgpt-for-business-coming-soon-says-openai

References (Cont.)

Wu, T., He, S., Liu, J., Sun, S., Liu, K., Han, Q. L., & Tang, Y. (2023). A brief overview of ChatGPT: The history, status quo and potential future development. *IEEE/CAA Journal of Automatica Sinica*, *10*(5), 1122-1136. doi:10.1109/JAS.2023.123618

Wutiwiwatchai, C. (2022). *Thailand's AI strategy to boost economic and social wellbeing.* Retrieved from https://oecd.ai/en/wonk/thailand-ai-strategies

Xu, S., & Zhang, X. (2023). Augmenting human cognition with an AI-mediated intelligent visual feedback. *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*, *26*, 1-16. doi:10.1145/3544548.3580905

Yan, M., Filieri, R., & Gorton, M. (2021). Continuance intention of online technologies: A systematic literature review. *International Journal of Information Management*, *58*, 1-43. doi:10.1016/j.ijinfomgt.2021.102315

Yashiv, E. (2007). Labor search and matching in macroeconomics. *European Economic Review*, *51*(8), 1859-1895. doi:10.1016/j.euroecorev.2007.06.024

Yue, Q. (2023). Study on the impact of artificial intelligence on employment and income inequality, based on technological determinism theory. In *8th International Conference on Financial Innovation and Economic Development (ICFIED 2023)* (pp. 329-338). doi:10.2991/978-94-6463-142-5_37

Zarifhonarvar, A. (2024). Economics of chatgpt: A labor market view on the occupational impact of artificial intelligence. *Journal of Electronic Business & Digital Economics*, *3*(2), 100-116. doi10.1108/JEBDE-10-2023-0021

Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education– where are the educators?. *International Journal of Educational Technology in Higher Education*, *16*(1), 1-27. doi:10.1186/s41239-019-0171-0

References (Cont.)

Zhang, B. (2023). ChatGPT, an opportunity to understand more about language models. *Medical Reference Services Quarterly*, *42*(2), 194-201. doi:10.1080/02763869.2023.2194149

Zhang, X., Shah, J., & Han, M. (2023). ChatGPT for fast learning of positive energy district (PED): A trial testing and comparison with expert discussion Results. *Buildings*, *13*(6), 1392. doi:10.3390/buildings13061392

Zhang, X., Wu, Y., & Liu, S. (2021). Exploring short-form video application addiction: Socio-technical and attachment perspectives. *Telematics and Informatics*, *57*, 101514. doi:10.1016/j.tele.2019.101243

Zhao, G., Li, Y., & Xu, Q. (2022). From emotion AI to cognitive AI. *International Journal of Network Dynamics and Intelligence*, *1*(1), 65-72. doi:10.53941/ijndi0101006

Zhao, Z., & Wang, S. (2022). The marriage consumption puzzle—evidence from China. *Applied Economics*, *55*(48), 5653-5673. doi:10.1080/00036846.2022.2140116

Ziegenfuss, D. (2021). *Qualitative research and NVivo: NVivo how-to guide*. Retrieved from https://campusguides.lib.utah.edu/nvivo

Appendices

Appendix A

Questionnaire

The Power of Generative AI: ChatGPT and Gemini as Opportunity or Disruption to Job Efficiency in Thailand

Your responses to this questionnaire are essential for data analysis and interpretation. Consequently, we ask for your assistance in answering the questionnaire based on your opinions and facts. The information you provide in this questionnaire will be kept confidential to analyze the data obtained.

5 = Strongly Agree
4 = Agree
3 = Neutral
2 = Disagree
1 = Strongly Disagree

Section 1: Demographic Profile

1. Gender
   ☐ Male
   ☐ Female

2. Age
   ☐ Below 20 years old
   ☐ 20 - 30 years old
   ☐ 31 - 40 years old
   ☐ 41 - 50 years old
   ☐ Over 50 years old

3. Education
   ☐ Lower than Beacher's Degree
   ☐ Beacher's Degree
   ☐ Higher than Beacher's Degree

4. Status

☐ Single

☐ Married

☐ Divorce

5. Income

☐ Less than 15,000 THB

☐ 15,000 - 30,000 THB

☐ 30,001 - 45,000 THB

☐ More than 45,000 THB

6. Social Media Platform Usage

☐ Facebook

☐ Instagram

☐ Twitter

☐ TikTok

☐ YouTube

Section 2: Information Technology Knowledge, ChatGPT, and Gemini

1. Which Information Technology area does AI predominantly influence?

   A) Telecommunications

   B) Data Analysis

   C) Supply Chain Management

   D) All of the above

   Answer: D) All of the above

2. Which programming language is commonly used for developing enterprise software?

   A) Python

   B) JavaScript

C) Java

D) All of the above

Answer: D) All of the above

3. What is ChatGPT?

   A) A blockchain technology

   B) An AI language model developed by OpenAI

   C) A cloud storage service

   D) A mobile operating system

   Answer: B) An AI language model developed by OpenAI

4. How does ChatGPT process and generate text responses?

   A) Using pre-written scripts

   B) Through an extensive database of human text

   C) By learning from real-time human interactions only

   D) It uses a transformer-based model trained on diverse internet text

   Answer: D) It uses a transformer-based model trained on diverse internet text

5. What is the main benefit of using AI like ChatGPT in businesses?

   A) Reducing physical office space

   B) Enhancing customer service

   C) Decreasing employee benefits

   D) Increasing manual workload

   Answer: B) Enhancing customer service

6. What is a drawback of using AI like ChatGPT in decision-making?

   A) It provides data-driven insights

   B) It increases the speed of decision-making

   C) It may not fully understand complex human emotions

   D) It reduces the workload on human employees

   Answer: C) It may not fully understand complex human emotions

7. What is Gemini?

   A) A blockchain technology

   B) An AI language model developed by Google

   C) A cloud storage service

   D) A mobile operating system

   Answer: B) An AI language model developed by Google

8. What is a potential advantage of using a Large Language Model like Gemini?

   A) It can perform complex mathematical calculations

   B) It can access and process information from vast amounts of data

   C) It can physically interact with the real world

   D) It can replace the need for human teachers altogether

   Answer: C) It can access and process information from vast amounts of data

9. What is a potential drawback of using a Large Language Model like Gemini?

   A) It is always objective and unbiased in its responses

   B) It may generate text that is factually incorrect or misleading

   C) It requires a very expensive and powerful computer to run

   D) It is only available in English

   Answer: B) It may generate text that is factually incorrect or misleading

10. How can you verify the accuracy and reliability of information from Gemini?

    A) Always trust the first answer it provides

    B) Critically evaluate the information and compare it with other sources

    C) Ask Gemini to confirm its sources and reasoning

    D) Only use Gemini for entertainment purposes

    Answer: B) Critically evaluate the information and compare it with other sources

Section 3: ChatGPT

1. Do you know ChatGPT?
   - ☐ Yes
   - ☐ No (End)

2. How do you know about ChatGPT?
   - ☐ Social Media
   - ☐ Television
   - ☐ Newspaper
   - ☐ Website
   - ☐ Peers

3. The Acceptance and Intention to Use ChatGPT

The Acceptance and Intention to Use ChatGPT	5	4	3	2	1
1. ChatGPT enhances my professional skills.					
2. I believe that ChatGPT can help me learn new things.					
3. Using ChatGPT helps improve efficiency in my career.					
4. Using ChatGPT helps boost motivation in my career.					
5. It is easy to use ChatGPT in my career.					
6. ChatGPT effectively meets the demands and objectives of my career, significantly improving my work.					
7. ChatGPT makes me more capable and improves my work.					
8. ChatGPT can provide me with good opportunities.					
9. I believe that ChatGPT does not pose a threat to my career.					
10. I believe that ChatGPT cannot replace my career.					
11. I enjoy using ChatGPT in my career.					
12. My opinion about ChatGPT is positive.					
13. I am satisfied with ChatGPT in my career.					
14. I will continue to use ChatGPT in the future.					
15. I will recommend ChatGPT to others.					

4. Concerns about ChatGPT Posing a Threat to the Career

Concerns about ChatGPT Posing a Threat to the Career	**5**	**4**	**3**	**2**	**1**
1. Facing replacement in the field of interpreting or translation					
2. Facing replacement in the field of customer service					
3. Facing replacement in the field of content creation					
4. Facing replacement in the field of research					
5. Facing replacement in the field of teaching or lecturing					

5. Perceptions of ChatGPT as an Opportunity for Future Careers

Perceptions of ChatGPT as an Opportunity for Future Careers	**5**	**4**	**3**	**2**	**1**
1. ChatGPT can assist in customizing CV and cover letters to align with the desired job position, all while ensuring a swift and high-quality completion.					
2. ChatGPT can generate entirely new comedic routines that have never been done before, using creative thinking and fresh ideas. This can be used to practice humor and enhance the fun in communication with others.					
3. ChatGPT can explain code operations clearly, using various programming languages and suitable tools, to ensure that the code functions correctly and with maximum efficiency.					
4. ChatGPT can create content in multiple languages by leveraging its knowledge and skills in writing and translation. This enables readers using different languages to access content conveniently and understand it easily, while ensuring accuracy in					

translation and the appropriate use of language, effectively conveying clear meanings.					
5. ChatGPT can write essays on any topic, utilizing its skills in analysis and crafting content in a format suitable for various subject matters.					

Section 4: Gemini

1. Do you know Gemini?
   - ☐ Yes
   - ☐ No (End)

2. How do you know about Gemini?
   - ☐ Social Media
   - ☐ Television
   - ☐ Newspaper
   - ☐ Website
   - ☐ Peers

3. The Acceptance and Intention to Use Gemini

The Acceptance and Intention to Use Gemini	**5**	**4**	**3**	**2**	**1**
1. Gemini enhances my professional skills.					
2. I believe that Gemini can help me learn new things.					
3. Using Gemini helps improve efficiency in my career.					
4. Using Gemini helps boost motivation in my career.					
5. It is easy to use Gemini in my career.					
6. Gemini effectively meets the demands and objectives of my career, significantly improving my work.					
7. Gemini makes me more capable and improves my work.					
8. Gemini can provide me with good opportunities.					
9. I believe that Gemini does not pose a threat to my career.					
10. I believe that Gemini cannot replace my career.					

11. I enjoy using Gemini in my career.					
12. My opinion about Gemini is positive.					
13. I am satisfied with Gemini in my career.					
14. I will continue to use Gemini in the future.					
15. I will recommend Gemini to others.					

4. Concerns about Gemini Posing a Threat to the Career

Concerns about Gemini Posing a Threat to the Career	**5**	**4**	**3**	**2**	**1**
1. Facing replacement in the field of interpreting or translation					
2. Facing replacement in the field of customer service					
3. Facing replacement in the field of content creation					
4. Facing replacement in the field of research					
5. Facing replacement in the field of teaching or lecturing					

5. Perceptions of Gemini as an Opportunity for Future Careers

Perceptions of Gemini as an Opportunity for Future Careers	**5**	**4**	**3**	**2**	**1**
1. Gemini can assist in customizing CV and cover letters to align with the desired job position, all while ensuring a swift and high-quality completion.					
2. Gemini can generate entirely new comedic routines that have never been done before, using creative thinking and fresh ideas. This can be used to practice humor and enhance the fun in communication with others.					
3. Gemini can explain code operations clearly, using various programming languages and suitable tools, to					

ensure that the code functions correctly and with maximum efficiency.					
4. Gemini can create content in multiple languages by leveraging its knowledge and skills in writing and translation. This enables readers using different languages to access content conveniently and understand it easily, while ensuring accuracy in translation and the appropriate use of language, effectively conveying clear meanings.					
5. Gemini can write essays on any topic, utilizing its skills in analysis and crafting content in a format suitable for various subject matters.					

Appendix B

Interview Questions

The Power of Generative AI: ChatGPT and Gemini as Opportunity or Disruption to Job Efficiency in Thailand

Your responses to this survey are essential for data analysis and interpretation. Consequently, we ask for your assistance in answering the questions based on your experiences, opinions and facts. The information you provide in this survey will be kept confidential to analyze the data obtained.

Section 1: Demographic Profile and General Information

1. Date and Time of the Interview: ____________________________
2. Gender: ____
3. Age: ____
4. Occupation: _______________________________________
5. Years of Active Involvement: ________________________
   (How many years have you been actively involved in either the education sector or the creative economy and tourism sectors?)
6. Experience with ChatGPT and Gemini: ___________________
   (Do you have recent knowledge of and experience with using ChatGPT and Gemini?)

Section 2: ChatGPT and Gemini as Opportunity or Disruption for the Future Career

1. What specific economic, technological, or market-driven factors have motivated your industry to adopt AI technologies like ChatGPT and Gemini?
2. Can you describe specific challenges or barriers—technical, cultural, or regulatory—that your organization has faced while attempting to integrate ChatGPT and Gemini?

3. What criteria does your organization use to evaluate the potential value and impact of AI tools like ChatGPT and Gemini before their full-scale integration into your operations?
4. How do different groups within your organization—such as executives, IT staff, and end-users—perceive the benefits and risks associated with ChatGPT and Gemini?
5. In what ways have AI technologies like ChatGPT and Gemini specifically altered the daily operations or business models within your industry? Please provide examples.
6. How has the integration of ChatGPT and Gemini influenced the importance of specific professional skills, and how is your organization responding to these changing skill demands?
7. How is the widespread adoption of AI technologies like ChatGPT and Gemini reshaping the competitive dynamics or strategic direction of your industry?
8. Could you discuss how AI technologies like ChatGPT and Gemini have affected the competitive landscape? Are there any new entrants or shifts in market power?
9. In what innovative ways has your organization utilized AI technologies like ChatGPT and Gemini to enhance creativity or develop new products and services?
10. What are the most significant disruptions caused by AI technologies like ChatGPT and Gemini within your workplace or market, whether positive or negative?
11. What specific strategies has your organization implemented to effectively adapt to the technological and operational changes brought about by ChatGPT and Gemini?
12. What do you foresee as the long-term implications of AI-driven disruptions, such as those introduced by ChatGPT and Gemini, in your industry over the next decade?
13. Can you quantify or describe the economic benefits that have arisen from implementing AI technologies like ChatGPT and Gemini in your industry?

14. How have career paths and professional opportunities within your industry evolved in response to the integration of AI technologies like ChatGPT and Gemini?
15. What impact has the adoption of AI like ChatGPT and Gemini had on employment levels, job roles, and workforce dynamics within your organization?
16. What specific types of training or educational programs do you believe are necessary to prepare professionals for the challenges and opportunities of an AI-integrated workplace?

Note: Within the framework of this survey, it is pertinent to acknowledge that not every question is directed towards each participant. A deliberate exclusion of certain queries is executed to guarantee their applicability to particular respondents, thereby ensuring the relevance of the survey content to individual participants' experiences and contexts.

Appendix C

AI Implementation Metrics and Performance Outcomes in Hotel Operations

- Language Service Distribution

Guest Communications (180 instances):
- Real-time Conversations: 45%
- Written Communications: 35%
- Service Requests: 20%
- Accuracy Rate: 98.7%

Document Translations (130 instances):
- Legal Documents: 30%
- Guest Information: 40%
- Policy Documents: 30%
- Accuracy Rate: 99.1%

Signage Translations (90 instances):
- Directional Signs: 35%
- Safety Instructions: 40%
- Facility Information: 25%
- Accuracy Rate: 99.8%

Menu Items (60 instances):
- Food Descriptions: 50%
- Ingredient Lists: 30%
- Dietary Information: 20%
- Accuracy Rate: 99.4%

- Survey Response Calculation

January Survey Metrics:
Total Guests: 625
Responses Received: 425
Response Rate = (425/625) × 100 = 68%

February Survey Metrics:

Total Guests: 624

Responses Received: 468

Response Rate = (468/624) × 100 = 75%

- Scoring System and Calculation Methods

5-Point Likert Scale:

5 = Excellent

4 = Very Good

3 = Good

2 = Fair

1 = Poor

Formula for Each Metric:

Average Score = ∑(Rating × Number of Responses) / Total Responses

Example (January Overall Satisfaction):

- 5 stars: 280 responses
- 4 stars: 98 responses
- 3 stars: 35 responses
- 2 stars: 8 responses
- 1 star: 4 responses

Calculation:

= ((5×280) + (4×98) + (3×35) + (2×8) + (1×4)) / 425

= (1400 + 392 + 105 + 16 + 4) / 425

= 1917 / 425

= 4.6/5

- Percentage Change Calculation

Formula: ((February Score - January Score) / January Score) × 100

Overall Satisfaction Example:
= ((4.8 - 4.6) / 4.6) × 100
= (0.2 / 4.6) × 100
= 0.043 × 100
= 4.3% increase

- Staff Responsiveness Calculation

Response Time Metrics:
Average Response Time = ∑(Individual Response Times) / Number of Requests

January Example:
Total Requests: 3,850
Total Response Time: 12,320 minutes
Average = 12,320 / 3,850 = 3.2 minutes

February Example:
Total Requests: 4,120
Total Response Time: 11,536 minutes
Average = 11,536 / 4,120 = 2.8 minutes

- Problem Resolution Calculation

First-Contact Resolution Rate:
January:
Total Issues: 420
Resolved First Contact: 357
Rate = (357/420) × 100 = 85%

February:

Total Issues: 445

Resolved First Contact: 409

Rate = (409/445) × 100 = 92%

- Communication Clarity Calculation

Language Accuracy Rate:

January:

Total Communications: 2,240

Accurate Communications: 2,195

Rate = (2,195/2,240) × 100 = 98%

February:

Total Communications: 2,380

Accurate Communications: 2,356

Rate = (2,356/2,380) × 100 = 99%

- Quality Control Measures

Statistical Validation:

- Confidence Level: 95%
- Margin of Error: ±2%
- Sample Size Validation
- Outlier Detection

Data Cleaning Process:

1. Remove incomplete responses
2. Identify and verify extreme ratings
3. Cross-validate responses
4. Check for response patterns

Appendix D

Certificate of Ethical Approval

COA. No. RSUERB2023-105

RSU-ERB

Certificate of Approval
By
Ethics Review Board of Rangsit University

COA. No.	COA. No. RSUERB2023-105
Protocol Title	The Power of Generative AI: Opportunities or Disruptions for the Future Careers
Principle Investigator	Asst.Prof.Tanpat Kraiwanit, Ph.D.
Co-Investigator	Mr.Pongsakorn Limna
Affiliation	Faculty of Economics, Rangsit University
How to review	Expedited Review
Approval includes	1. Project proposal 2. Information sheet 3. Informed consent form 4. Data collection form/Program or Activity plan

Date of Approval: 14 July 2023
Date of Expiration: 14 July 2025

The prior mentioned documents have been reviewed and approved by Ethics Review Board of Rangsit University based Declaration of Helsinki, The Belmont Report, CIOMS Guideline and International Conference on Harmonization in Good Clinical Practice or ICH-GCP

RSU-ERB 14 JUL 2023

Signature..

(Associate Professor Dr. Panan Kanchanaphum)

Chairman, Ethics Review Board for Human Research

Ethics Review Board of Rangsit University, 5th floor, Arthit Ourairat Building (Bldg.1) Rangsit University
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Biography

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