

Article

An Empirical Evaluation of a Generative Artificial Intelligence Technology Adoption Model from Entrepreneurs' Perspectives

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Abstract: Technologies, such as Chat Generative Pre-Trained Transformer (ChatGPT, Smart PLS version 4), are prime examples of Generative Artificial Intelligence (AI), which is a constantly evolving area. SMEs, particularly startups, can obtain a competitive edge, innovate their business models, gain business value, and undergo a digital transformation by implementing these technologies. Continuous but gradual experimentation with these technologies is the foundation for their adoption. The experience that comes from trying new technologies can help entrepreneurs adopt new technologies more strategically and experiment more with them. The urgent need for an in-depth investigation is highlighted by the paucity of previous research on ChatGPT uptake in the startup context, particularly from an entrepreneurial perspective. The objective of this research study is to empirically validate the Generative AI technology adoption model to establish the direction and strength of the correlations among the adoption factors from the perspectives of the entrepreneurs. The data are collected from 482 entrepreneurs who exhibit great diversity in their genders, the countries in which their startups are located, the industries their startups serve, their age, their educational levels, their work experience as entrepreneurs, and the length of time the startups have been on the market. Collected data are analyzed using the Partial Least Squares Structural Equation Modeling (PLS-SEM) technique, which results in a statistical examination of the relationships between the adoption model's factors. The results indicate that social influence, domain experience, technology familiarity, system quality, training and support, interaction convenience, and anthropomorphism are the factors that impact the pre-perception and perception phase of adoption. These factors motivate entrepreneurs to experiment more with the technology, thereby building perceptions of its usefulness, perceived ease of use, and perceived enjoyment, three factors that in turn affect emotions toward the technology and, finally, switching intentions. Control variables like age, gender, and educational attainment have no appreciable effect on switching intentions to alternatives of the Generative AI technology. Rather, the experience factor of running businesses shows itself to be a crucial one. The results have practical implications for entrepreneurs and other innovation ecosystem actors, including, for instance, technology providers, libraries, and policymakers. This research study enriches the Generative AI technology acceptance theory and extends the existing literature by introducing new adoption variables and stages specific to entrepreneurship.

Keywords: Generative Artificial Intelligence; Chat Generative Pre-Trained Transformer (ChatGPT); technology adoption; entrepreneurs; small- and medium-sized enterprises (SMEs)



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1. Introduction

An autonomous artificial intelligence (AI) system that can produce new content, graphics, audio, and video is called Generative Artificial Intelligence (AI) [1]. These systems generate outputs, including, for instance, video and text, in response to the user's queries. ChatGPT (Generative Pre-Trained Transformer) is one example of a Generative

AI model that fosters human-style conversations with the users to provide them with the information that they are looking for. For instance, ChatGPT can provide entrepreneurs with information about foreign markets to help in their global business model innovation efforts. This technology can also help software startup entrepreneurs in their programming tasks, including, for instance, generating or debugging the software codes in response to the entrepreneur's prompts. The ability to generate accurate information is grounded on the technology's continuous learning from user feedback, training datasets, and the ability to prompt it with accurate prompts.

Generative AI technology is still evolving, but its practical applications in entrepreneurship education [2] and business operations [3] are well-reported in the literature. For instance, in the knowledge industry, such as libraries, ChatGPT is reported to have greater applicability in different operations, such as library cataloging operations, reference services, information searching, language translation, and much more [4–8]. The applicability of these technologies for creating business values seems evident; however, the conceptualization of theory around this topic is a process that will require time and thorough research investigation. Researchers are still developing thorough theoretical frameworks that can adequately represent the complex dynamics and business consequences of these technologies, as the field of Generative AI continues to innovate quickly.

The technological value lies in its ability to meet business needs, i.e., to provide the benefits with minimal effort. This means SMEs must better understand their business needs and the functional capabilities of the technology to decide if there is a fit between technology and business tasks. These technologies exhibit advanced functionalities, but they also come with inherent limitations. These limitations encompass inaccurate outcomes, biases, and the challenge of source traceability. This raises issues about the extent of entrepreneurs' dependence on ChatGPT, including full, partial, or no dependence at all. The perceived usefulness seems to be an important factor in deciding on adoption and dependency on the technology. However, the perceived ease of use element may still be crucial in adoption, as a technology's usefulness depends on users' ability to prompt it appropriately and easily.

To navigate concerns around user dependency on this technology, the researcher's suggestion is to view ChatGPT not as a sole decision-making entity but rather as a knowledge collaborator. Entrepreneurs should utilize ChatGPT outputs as hypotheses, providing directions for further investigation, verification, and validation from diverse knowledge sources (including human expertise). This approach aligns with the quest for more reliable business-related facts about, for instance, business model elements, enabling entrepreneurs to make informed and rational business decisions with ethical and appropriate integration of ChatGPT with business operations, including, for instance, in market research. To accomplish this, it is important to develop a complete understanding of the technology's capabilities and its limitations, which is grounded in gaining an understanding of the technology's adoption factors. This helps entrepreneurs to obtain directions about how to enhance their understanding of the technology by, for instance, leveraging across social networks and experimenting with technology to evaluate its quality, leading to rational adoption decisions and seamless integration with business practices that add business value. This also reduces full dependency on technology, and entrepreneurs gain dynamic capabilities to experiment with new technologies and adopt valuable ones to execute business tasks that could benefit the most from them.

A Generative AI technology adoption model based on the professional experience of the authors with small- and medium-sized enterprises (SMEs) is proposed in [9], which suggests that entrepreneurs adopt the technology in stages and that each stage is influenced by numerous factors. The adoption happens in three stages: the pre-perception and perception stage, the assessment stage, and the outcome stage. The pre-perception and perception phase is influenced by various factors, such as social factors, domain experience, technology experience, system quality, training and support, interaction convenience, and anthropomorphism. The assessment stage is influenced by *perceived usefulness*, *perceived ease of use*, and *perceived enjoyment*, which together generate emotions towards the technology,

which triggers the outcome stage. The final stage, i.e., the outcome stage, finally results in switching intentions, i.e., adoption of technology, use of human expertise, or switch to alternative technologies. The generative models, such as ChatGPT, are task-oriented by nature, but their uptake is also influenced by social values (hedonic values) [9]. During initial interaction with the technology, entrepreneurs may experiment with it for fun, which then translates into more consecutive interactions for professional reasons and, finally, its adoption. This signifies that those initial experimentations may be driven by hedonic values for some entrepreneurs, but this converges into utilitarian motivations to rigorously evaluate the technology to be used for solving business problems.

The objective of this research study is to empirically validate the Generative AI technology adoption model to establish the direction and strength of the correlations among the adoption factors, also known as latent variables, of the model proposed in [9]. The adoption model has been empirically validated from the perspectives of entrepreneurs who have either already incorporated Generative AI technology, such as ChatGPT, into their business operations or are aiming to do so. The technology adoption model for Generative AI applies to other actors in the innovation ecosystem that actively help enterprises, such as librarians; however, empirical validation from these actors' viewpoints is out of the scope of this research. In this research paper, Generative AI technology and ChatGPT terms are used interchangeably.

The empirical validation of the model will enhance its practical applicability. The results will provide robust evidence of the correlations among adoption factors of the Generative AI adoption model. The outcomes will help entrepreneurs to make strategic decisions about the adoption of Generative AI technology that meets their business needs and can be adopted within its liabilities of newness and smallness. This ensures that the adoption of a particular technology amongst the multiple options aligns with the specific context of the SMEs, the challenges faced by them, and their unique business needs. There is continuous innovation in AI, Generative AI technologies, and the solutions that are driven by AI. Understanding the adoption factors and their relationships will provide a valuable strategic guide for entrepreneurs to make rational adoption decisions. The strategic decisions are grounded in the formalization of the AI adoption process as a small-scale, incremental experiment. These experiments help the organizations to increase their understanding of technology capabilities, thus leading to its incremental adoption [9,10]. The empirically validated adoption model will help entrepreneurs decide if the technology seems worthy to be subjected to adoption experiments aligning with SMEs' working contexts, business needs, and constraints.

2. Artificial Intelligence Technology Adoption Models: Theoretical Background

The landscape of AI technology adoption models demonstrates a variety of technology adoption models, each with unique adoption factors. This variability calls for a more thorough analysis of Generative AI, especially ChatGPT, and it calls for a more comprehensive model drawing upon existing AI adoption models and other adoption factors.

The authors of [11], based on a literature review of 60 articles focusing on the adoption of AI technologies, reported that the researchers used extended TAM, UTAT, and AIDUA models. The adoption was investigated in the context of six industries: customer service, education, healthcare, organizations, consumer products, and others. Extra variables were added to extend TAM and UTAT models to investigate AI technologies, but the AIDUA model has not been extended yet.

The authors of [12] proposed an AIDUA model that described that the customers undergo three stages before they finally show their willingness to accept or show their objection to the use of AI technologies. It was reported that traditional technology adoption models, such as, for instance, the TAM model, were not designed to investigate the adoption of intelligent technologies, including, for instance, AI-driven customer service systems that operate without human intervention. It was also stated that some of the constructs of traditional models, such as, for instance, perceived ease of use, do not apply to AI-driven

systems as these systems are designed in a way that they do not require customers to learn them and, in fact, they provide services without the human (or operator) intervening. This is also in line with the suggestion disseminated in [13].

According to this model, AI technology adoption is a three-stage process that involves the primary appraisal stage, secondary appraisal, and the outcome stage. When someone believes that using AI devices is significant (based on social influence, hedonic motivation, and anthropomorphism factors in the primary appraisal stage), they carefully weigh the costs and advantages, taking performance expectancy and effort expectancy into account (called secondary appraisal). Customers' willingness and level of opposition in the service delivery process (referred to as the outcome stage) are influenced by the emotions that the secondary assessment stage arouses towards AI devices. The three stages—primary appraisal, secondary appraisal, and outcome—form a comprehensive framework for understanding customer acceptance of AI devices. This model has been used to investigate customer acceptance of (or objection to) AI devices in customer service industries, with AI devices intended to replace the humans offering customer service, and it is reported in the literature to have significant prediction power [11]. However, there is a need to further investigate this model across different industries to better explore its potential across industries where the AI system will be partially or fully controlled by human experts.

The authors of [14] proposed the T-AIA model based on the premise that social influence, hedonic motivation, and anthropomorphism factors used in the AIDUA model are more applicable to social-oriented AI devices than task-oriented AI devices. Task-oriented AI device adoption depends on their ability to help customers achieve their functional goals, such as, for instance, their ability to provide functionality to solve problems. Hence, AI device adoption should be guided more by utilitarian value rather than hedonic motivation. This model also employs three stages of technology adoption as used in AIDUA—primary appraisal, secondary appraisal, and outcome—but with different factors playing an important role in the technology adoption decision-making process. Utilitarian motivation, interaction convenience, and task–technology fit factors will be prominent in the primary appraisal of the technology, perceived competence and flow experience will be prominent in the secondary appraisal, and switching intention (customer willingness to use the AI system or to switch to the human services) will be prominent in the outcome stage.

Researchers have also adapted existing technology adoption models as research frameworks to study the adoption of Generative AI technologies, such as ChatGPT. For instance, research studies have employed the extended form of models like the TAM model [15–18], the UTAT model [19,20], and the AIDUA model [21]. The adoptions of technology were empirically explored from the perspectives of students [15–19], knowledge workers [20], customers [21], and healthcare professionals [22].

The authors of [9] provided a technology adoption model for Generative AI that works in three stages: the pre-perception and perception stage, the assessment stage, and the outcome stage. In the pre-perception and perception phase, entrepreneurs embark on their journey by familiarizing themselves with Generative AI technologies through iterative experimentation on simple business tasks. Influenced by *social factors, domain experience, technology experience, system quality, training and support, interaction convenience, and anthropomorphism*, entrepreneurs gradually explore the technology's potential, with utilitarian and hedonic values playing crucial roles.

The assessment stage represents a pivotal point where entrepreneurs delve deeper into the technology, utilizing it for more complex tasks. This stage involves a nuanced evaluation process, where certain factors, such as *perceived usefulness, perceived ease of use, and perceived enjoyment*, contribute to the emotional responses of entrepreneurs toward the technology. Utilitarian value becomes more prominent in this stage in generating emotions and influencing *switching intentions* (the *outcome stage*). Finally, in the outcome stage, emotions from the assessment stage translate into decisive switching intentions. Entrepreneurs make critical decisions on whether to adopt Generative AI, explore alternative solutions, or utilize human services (*for instance, expert advice*). The adoption model is mapped to

the research model by highlighting the connections between the adoption factors (*latent variables*) that are subjected to empirical validation in this article.

The technology adoption model for Generative AI is provided from the perspectives of the entrepreneurs. Nevertheless, there are no research studies in the literature that have empirically validated how entrepreneurs perceive the application of Generative AI technology in their startup working context.

3. Research Framework

3.1. Research Model and Research Hypothesis

The Generative AI technology adoption model proposed in [9] suggests that entrepreneurs make adoption decisions or switch to human experts or alternative solutions in three stages—the pre-perception and perception stage, the assessment stage, and the outcome stage—with different factors influencing these stages. The technology adoption model contains 12 latent variables: *social factors (SF)*, *domain experience (DE)*, *technological familiarity (TF)*, *system quality (SQ)*, *training and support (TS)*, *interaction convenience (IC)*, *anthropomorphism (A)*, *perceived usefulness (PU)*, *perceived ease of use (PEU)*, *perceived enjoyment (PE)*, *emotions (E)*, and *switching intentions (SI)*.

The indicators assessing these 12 latent variables are recorded in the Questionnaire (Appendix A) to empirically validate this adoption model. The number of indicators measuring the latent variables is as follows: *social influence or social factor (SF)* is 6, *domain experience (DE)* is 3, *technological familiarity (TF)* is 3, *system quality (SQ)* is 10, *training and support (TS)* is 3, *interaction convenience (IC)* is 4, *anthropomorphism (A)* is 3, *perceived usefulness (PU)* is 6, *perceived ease of use (PEU)* is 6, *perceived enjoyment (PE)* is 3, *emotions (E)* is 6, and *switching intentions (SI)* is 3.

The structural equation model is composed of measurement models and the structural model. The measurement model connects the indicators measuring the 12 latent variables with latent variables. Through a structural model, latent variables are associated with the others. Figure 1 displays the structural model that highlights the connections between latent variables, with the hypothesis labeled on arrows connecting two latent variables. The hypotheses are empirically tested in this research paper. An explanation of each latent variable in a structural model is provided in Table 1.

Table 1. Generative AI technology adoption model latent variables [9].

Latent Variables	Definition
Pre-Perception and Perception Phase	
Social Influence (SI) or Social factors (SF)	Social influence or social factors is defined as the “impact of an entrepreneur’s social environment, including observations of competitors, Family, and friends, on his actions and behaviours”.
Domain Experience (DE)	Domain experience is defined as “the level of expertise an entrepreneur possesses in conducting business operations within the specific industry”.
Technological Familiarity (TF)	Technology experience is defined as “the prior exposure and interactions an entrepreneur has had with the Generative technology for personal or professional purposes”.
System Quality (SQ)	System quality is defined as the “comprehensive evaluation of a generative AI system, considering both functional and non-functional attributes”.
Training and Support (TS)	Training and support is defined as the “availability of comprehensive resources to assist entrepreneurs in enhancing their Knowledge, Skills, and Abilities in facilitate a deeper understanding and proficient use of Generative AI technologies”.

Table 1. Cont.

Latent Variables	Definition
Interaction Convenience (IC)	Interaction convenience is defined as the “user-friendly and seamless nature of the Generative AI technology interface, which makes it easier for the entrepreneurs to easily have interactions with the technology”.
Anthropomorphism (A)	Anthropomorphism is defined as “the extent to which entrepreneurs attribute human-like characteristics to a generative AI system”.
Assessment stage	
Perceived Usefulness (PU)	Perceived usefulness is defined as “the degree to which an entrepreneur believes that using the Generative AI technology for his business operations would enhance efficiency, productivity, and overall effectiveness, contributing meaningfully to the achievement of operational goals and addressing complex tasks in a manner that surpasses alternative methods or tools”.
Perceived Ease of Use (PEU)	Perceived ease of use is defined as “the extent to which entrepreneurs believe that interacting with the technology is straightforward, uncomplicated, and requires minimal effort”.
Perceived Enjoyment (PE)	Perceived enjoyment is defined as “pleasure and satisfaction entrepreneurs derive from working with generative AI technology only rather than from the expected performance improvements in business activities or tangible benefits that may result from using the technology”.
Emotions	Emotions are defined as a “mental state of readiness that cultivates behavioural actions of the entrepreneurs (happiness, anger, anxiety. . .) and helps them organize their behaviour (technology adoption or switch to human experts) in response to stimuli (external factors resulting in emotional responses)”.
Outcome stage	
Switching Intention (SI)	Switching intention is defined as an “entrepreneur’s readiness to make a transition from using Generative AI technology to alternative solutions, for instance, seeking human expertise or exploring other options”.

Based on the researcher’s professional experience interacting with SMEs, the adoption factors (also called *latent variables in the structural model*) and their relationships have been identified in [9]. The relationships between latent variables (Figure 1) are formulated as hypotheses for empirical evaluation to confirm and quantify these linkages in a methodical and evidence-based way. The hypotheses subjected to the empirical validation to meet the research objectives are given below (for more details about the hypothesis, please refer to [9]).

The entrepreneurs’ favorable perceptions of the usefulness, ease of use, and enjoyment of Generative AI technologies are influenced by their collective experiences, perspectives, and support from the social network of the entrepreneurs. The social factors make them aware of the technology and motivate them to try it. Psychosocial elements, including social aspects, have been identified as one of the adoption factors mentioned in the literature according to the comprehensive literature review about the acceptance of AI conducted in [11]. According to different studies [12,13], one of the factors influencing consumers’ acceptance of AI-enabled service robots in the service sector is social influence. This is consistent with research study findings indicating that social influence plays a role in ChatGPT users’ adoption [18,21].

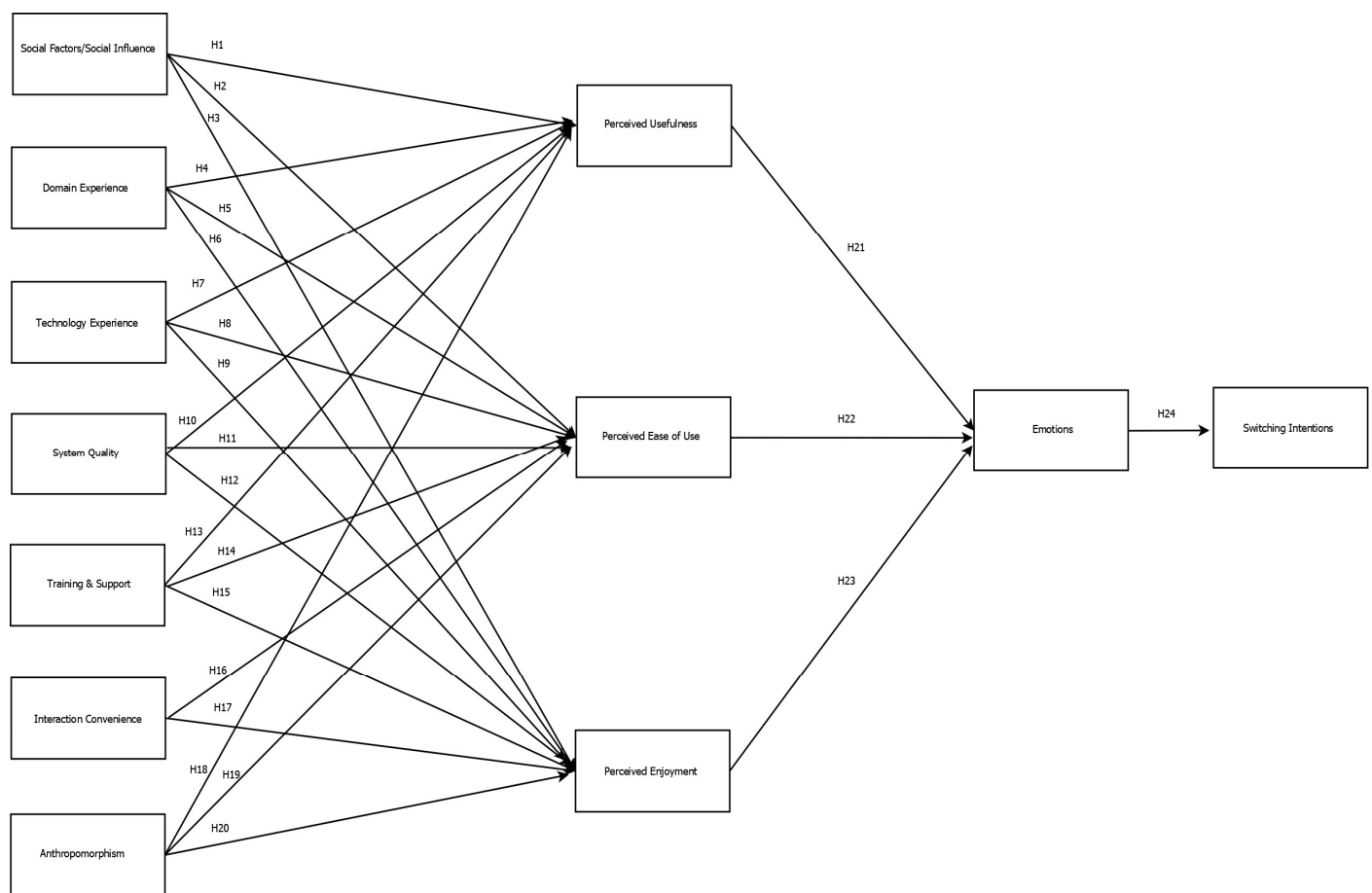


Figure 1. Structural model [9].

- H1:** Social factors (*SF*) positively influence the perceived usefulness (*PU*) of Generative AI technology among entrepreneurs.
- H2:** Social factors (*SF*) positively influence the perceived ease of use (*PEU*) of Generative AI technology among entrepreneurs.
- H3:** Social factors (*SF*) positively influence the perceived enjoyment (*PE*) of Generative AI technology among entrepreneurs.

The rich expertise in the industrial domain and current awareness of Generative AI technology help entrepreneurs to identify the technology's capabilities to improve existing business practices and provide business value. This impacts the entrepreneurs' perceptions of the technology's usefulness, ease of use, and overall enjoyment.

- H4:** Domain experience (*DE*) positively influences the perceived usefulness (*PU*) of Generative AI technology among entrepreneurs.
- H5:** Domain experience (*DE*) positively influences the perceived ease of use (*PEU*) of Generative AI technology among entrepreneurs.
- H6:** Domain experience (*DE*) positively influences the perceived enjoyment (*PE*) of Generative AI technology among entrepreneurs.

Entrepreneurs are encouraged to experiment with technology more when they have prior expertise with it, whether in a personal or professional context. This improves their comprehension of the technology, which influences their perceptions of the technology's usefulness, ease of use, and overall enjoyment. The literature reports the impact of the user's experience with the technology on perceived usefulness [23,24] as well as perceived ease of use [25].

- H7:** Technology experience (*TE*) positively influences the perceived usefulness (*PU*) of Generative AI technology among entrepreneurs.
- H8:** Technology experience (*TE*) positively influences the perceived ease of use (*PEU*) of Generative AI technology among entrepreneurs.
- H9:** Technology experience (*TE*) positively influences the perceived enjoyment (*PE*) of Generative AI technology among entrepreneurs.

A high level of technology quality enables entrepreneurs to get over their reluctance to try out new technologies and expand their experimentation efforts. This helps them to meet their business needs, thereby impacting their perceptions of the technology's usefulness, ease of use, and overall enjoyment. ChatGPT's enhanced quality could result in students' enhanced intentions to adopt this technology for learning [17]. Furthermore, the customer's intention to adopt the AI technology in the service industry is dependent on multiple factors, including quality of the service [26]. Service quality is determined by multiple factors, including, for instance, reliability, quick service time, accuracy etc., and hence influences customer performance expectancy towards AI technology (also called perceived usefulness) [12,13].

- H10:** System quality (*SQ*) positively influences the perceived usefulness (*PU*) of Generative AI technology among entrepreneurs.
- H11:** System quality (*SQ*) positively influences the perceived ease of use (*PEU*) of Generative AI technology among entrepreneurs.
- H12:** System quality (*SQ*) positively influences the perceived enjoyment (*PE*) of Generative AI technology among entrepreneurs.

Entrepreneurs who are resistant to technology can overcome this with the use of training resources like YouTube videos, in-house training programs, and guidelines. These resources also improve the entrepreneurs' grasp of technology and enable them to use it to meet their business needs. Providing training materials to the students will enhance their effort and performance expectancy of the AI technology [15]. Additionally, to enhance the user's comfort level with the technology, especially among older people, necessary trainings need to be provided [21]. User perceptions are shaped by the technology's usefulness, ease of use, and overall enjoyment through training programs.

- H13:** Training and support (*TS*) positively influence the perceived usefulness (*PU*) of Generative AI technology among entrepreneurs.
- H14:** Training and support (*TS*) positively influence the perceived ease of use (*PEU*) of Generative AI technology among entrepreneurs.
- H15:** Training and support (*TS*) positively influence the perceived enjoyment (*PE*) of Generative AI technology among entrepreneurs.

Because of its intuitive interface, technology is easy to use and allows businesses to become familiar with it through basic interactions. This impacts their perceptions regarding technology's ease of use and overall enjoyment. The authors of [14] reported that interaction convenience is one of the factors that impacts the utilitarian motivation, including, for instance, functional aspects of ChatGPT that trigger motivation to give it a try, which finally impacts perceived competence and reduces the switching intentions. The simple ChatGPT interface could reduce students' perception of efforts involved in using the technology and therefore could enhance its adoption rate [15]. The technology interface makes it possible to undertake interactions with it, thereby contributing to the user's positive experiences with it [21,27].

- H16:** Interaction convenience (*IC*) positively influences the perceived ease of use (*PEU*) of Generative AI technology among entrepreneurs.
- H17:** Interaction convenience (*IC*) positively influences the perceived enjoyment (*PE*) of Generative AI technology among entrepreneurs.

Entrepreneurs think that Generative AI technologies may effectively address their needs and solve problems in a way that is comparable to that of humans. This impacts

their perception of technology's usefulness. The ability of technology to communicate with humans allows them to engage with it more instinctively and naturally. This positively impacts their perception of ease of use. It can also increase perceived enjoyment because entrepreneurs would feel more satisfied dealing with a system that they think is more relevant and human-like in its reactions. The literature reports the impact of anthropomorphism on perceived usefulness, performance expectancy, or performance expectations [21] and perceptions of ease of use, effort expectancy, or humanness [12,21]

H18: Anthropomorphism (*A*) positively influences the perceived usefulness (*PU*) of Generative AI technology among entrepreneurs.

H19: Anthropomorphism (*A*) positively influences the perceived ease of use (*PEU*) of Generative AI technology among entrepreneurs.

H20: Anthropomorphism (*A*) positively influences the perceived enjoyment (*PE*) of Generative AI technology among entrepreneurs.

The favorable contributions of the pre-perception and perception stage factors lead to more technological evaluation and interaction, which improves knowledge of the technology's potential and related constraints. This impacts their perceptions of the technology's usefulness, ease of use, and enjoyment. These factors together generate emotions towards the technology. Positive contributions lead to positive emotions and negative contributions result in negative emotions. Customer emotions towards AI technology are influenced by performance and effort expectancy, which collectively drive its adoption in the service industry [12]. Users of technology who feel that interacting with it is enjoyable will also embrace technology and be more likely to utilize it because they appreciate it (positive emotions) [28].

H21: Perceived usefulness (*PU*) positively influences the entrepreneur's positive emotions (*E*) towards the Generative AI technology.

H22: Perceived ease of use (*PEU*) positively influences the entrepreneur's positive emotions (*E*) towards the Generative AI technology.

H23: Perceived enjoyment (*PE*) positively influences the entrepreneur's positive emotions (*E*) towards the Generative AI technology.

Positive emotions result in the adoption of the Generative AI technology in business operations. Negative emotions towards the technology result in switching to human services or the adoption of alternative solutions. A customer's emotions impact the customer's adoption of the AI technology [12]. This means that their intentions to switch from ChatGPT are negatively related to their emotions towards the technology.

H24: Entrepreneur's emotions (*E*) towards the Generative AI technology negatively impact their switching intentions (*SI*).

3.2. Control Variables

The use of age and gender variables as control variables made it possible to fully grasp the potential perceptions and adoptions of Generative AI technology (or switch to their alternatives) by various age groups and gender identities. For instance, older adults may have different concerns and decision-making criteria about Generative AI technology adoption compared to other age groups customers [28,29]. Gender can also be included as a control variable to investigate technology adoption by customers [29]. The impact of previous entrepreneurial experiences is considered when the working experience of an entrepreneur is included as a control variable. This allows for the recognition of the possible influence of seasoned vs. novice entrepreneurs. Entrepreneurs with previous experiences in entrepreneurship will have previous knowledge and experimentation skills to test new technologies and find their match with their business needs more easily than those with less experience. Finally, to investigate how different educational backgrounds might influence entrepreneurs' perspectives and adoption of Generative AI (or their alternatives), educational attainment is used as a control (*this research only considers a Bachelor's degree and above*). Users' willingness to use technology is influenced by their educational attainment,

and hence it is important to include education levels as control variables to investigate technology adoption by customers [30,31]. Those with higher education are more likely to be inclined to experiment with new technologies to improve their job performance and solve their business problems. This allows for a more nuanced interpretation of the study's findings.

In this study, four hypotheses—H25, H26, H27, and H28—are being evaluated. The control factors in this research include the demographics of the study participants, namely age, gender, working experience as an entrepreneur, and educational attainment. Any influence these characteristics may have on the adoption of technology will be examined (or, alternatively, on switching intentions).

H25: An entrepreneur's gender (*G*) has a negative impact on switching intentions (*SI*).

H26: An entrepreneur's age (*AG*) negatively impacts their switching intentions (*SI*).

H27: An entrepreneur's working experience as an entrepreneur (*WAE*) negatively impacts their switching intentions (*SI*).

H28: An entrepreneur's educational Level (*EL*) has a negative impact on switching intentions (*SI*).

4. Research Methods

4.1. Participant Recruitment and Data Collection

This research study uses convenience or purposeful sampling, which is a non-probabilistic sampling technique. The samples came from the researcher's professional network and extended network in public libraries, universities, accelerators, incubators, and other comparable establishments. The entrepreneurs that make up the samples are those who have either used Generative AI technology in the past or are considering doing so. Because they have experience with Generative AI technology, especially ChatGPT technology, the sampled startups can provide meaningful information on the factors driving technology acceptance, thereby helping to meet the formulated research objectives. Furthermore, entrepreneurs of startups are considered in this study, i.e., the SMEs that offer innovative products in the market (*or are in pre-startup phase to have a successful launch in the future*) and aim to gain quicker success in the markets. The ability of successful startups to offer innovative products or services that solve user needs is the reason for their disruption and quicker market expansions. Hence, entrepreneurs associated with SMEs offering products or services that are not highly innovative, such as, for instance, restaurants and bakeries, are excluded from this study.

By including entrepreneurs who are using (*or intend to use*) ChatGPT, this research study can provide insight into their early impressions and level of awareness of the technology. These people probably have ideas and insights regarding how ChatGPT might be incorporated into the business's operations, and they can offer helpful details about the expected advantages and difficulties. This early awareness stage provides a more comprehensive view of the adoption process by helping to comprehend the earliest factors and reasons that influence the decision to adopt. Entrepreneurs who are currently utilizing ChatGPT offer firsthand knowledge and practical insights into incorporating Generative AI technology into day-to-day operations. Their opinions can provide insightful viewpoints on the real advantages, difficulties faced, and overall effects on productivity and workflow. By including these two categories of entrepreneurs, this study pulls on the real-world experiences of those who have used ChatGPT, as well as those who have been motivated to give technology a try, thereby leading to rigorous and scientific evaluation of the adoption model.

As per the research study's protocol, a total of 600 entrepreneurs were provided with the University of Leicester's standard participant information sheet, General Data Protection Regulation (GDPR) privacy notice, and an informed consent form to fill out (*termed the research information sharing stage*). The participant information sheet provides details about the research project, including its goals, potential risks, participation benefits, voluntary participation requirements, data confidentiality, specifications regarding any acquisition

of personal data, safety measures, and contact information for any inquiries. This information document's goal is to assist potential participants in making an informed choice regarding whether to participate in the research project. If participants voluntarily provide their personal information for follow-up in the future (which is entirely voluntary), the GDPR Privacy Notice is applicable. This document describes how the personal information that study participants provide to the project is collected and used. Participants must fill out, sign, and return the informed consent form to the researchers, thus indicating their willingness to take part in the study, *including those referred by the researcher's professional network, also called the extended professional network (termed the information consent stage)*. The participating entrepreneurs received structured questions to fill out after obtaining their informed consent (*termed the survey stage*).

The survey questionnaire is attached as Appendix A. The researchers received a total of 482 informed consents, yielding an 80% response rate. It is worth noting that this figure not only includes the sole entrepreneurs but also co-founders who actively engaged in the filling out of the research survey, thus providing a comprehensive perspective of the entrepreneurial landscape and highlighting the collaborative nature of the entrepreneurial landscape. These entrepreneurs then received the structured questions to fill out in the form of the Google form link. The research study protocol, the University of Leicester's standard participant information sheet, the General Data Protection Regulation (GDPR) privacy notice, and an informed consent form are available in [32] (*also attached as Appendix B–F*). The research information sharing stage and information consent stage occurred from 3 January 2024 to 9 January 2024, and the survey stage occurred from 10 January 2024 to 19 January 2024 (*end dates inclusive*).

Unless and until the participant explicitly provides their personal information for follow-up, no personal information will be recorded on the survey form. Additionally, the Google form does not save the participants' email addresses. Personal information for future follow-up can be provided at the end of the Questionnaire (Google form). These optional follow-up discussions aim to elicit insightful viewpoints regarding the results of the analysis and to obtain their overall opinion on potential implications going forward. In case they agree to participate in future follow-ups, a new participant information sheet and an informed consent form were to be shared with participants [32]. The General Data Protection Regulation (GDPR) privacy notice remains the same. As there were no requests for further follow-up, a revised participant information sheet and an informed consent form (for follow-ups) were not shared, and no personal data were collected.

The demographic profiles of the participants, as captured by Section 1 of the questionnaire (Appendix A), are shown in Table 2.

Table 2. Participant profiles (table by authors).

Parameter	Number	Percentage (%)
Continent		
Asia	126	26.14
America	79	16.39
Africa	57	11.82
Australia	43	8.92
Europe	177	36.7
Industry Served		
Engineering	95	19.71
Medical	41	8.51
Consulting	106	21.99
Education	92	19.09

Table 2. Cont.

Parameter	Number	Percentage (%)
Other	148	30.71
Gender Identity		
Male	249	51.66
Female	217	45.02
Other	0	0
Prefer not to say	16	3.32
Startup Age		
1 year (or less)	142	29.46
More than 1 year but less than 3 years	163	33.82
More than 3 years but less than 5 years	107	22.20
More than 5 years	70	14.52
Participant Age		
18–25 Years	137	28.42
26–35 Years	151	31.33
36–45 Years	102	21.16
>45 Years	92	19.09
Years of experience as an entrepreneur		
Less than 3 years	119	24.69
3–5 years	113	23.44
5–10 years	144	29.88
More than 10 years	106	21.99
Educational Qualification		
Bachelor's degree	193	40.04
Master's Degree	147	30.50
Doctorate Degree	142	29.46

According to Table 2, the study's participants are from Europe (37%), Asia (26%), Africa (12%), America (16%), and Australia (9%). Participants are split 52% male and 45% female, with 3% choosing not to disclose their gender identity. A wide range of industries, including engineering (20%), medicine (9%), consulting (22%), education (19%), and others (31%), are served by the contributing startups. Entrepreneurs participating in the research survey had been leading startups that were in business for one year or less (30%), more than one year but less than three years (34%), more than three years but less than five years (22%), or more than five years (15%). The participants of the research survey exhibit great diversity in terms of various factors, including, for instance, the countries in which their startups are located, their gender, the industries their startups serve, their age, their educational levels, their work experience as entrepreneurs, and the length of time the startups have been on the market.

4.2. Data Analysis

Without altering the independent variable, the data gathered from the entrepreneurs were analyzed using the Partial Least Squares Structural Equation Modeling (PLS-SEM) technique, which results in a statistical examination of the relationships between the adoption model's factors. The reason PLS-SEM was chosen for the data analysis was because it has been shown to perform well with complex models (the adoption model

is complex, involving many different factors and interactions), small sample sizes (the number of entrepreneurs using ChatGPT is growing, but the population is still small), and no assumptions about the distribution of the data (the distribution of the Likert-scale-collected data is uncertain) [33,34]. Moreover, this methodology is appropriate if the goal of the study is theory development, elucidating the extent to which the independent variables (factors or predictors) in the adoption model can account for the variability in the dependent variables (constructs), and forecasting the associations among various constructs in the adoption theoretical model [34]. The analysis involves assessment in two stages, namely, the Measurement Model Assessment (the model is a reflexive measurement model), and the Structural Model Assessment (*refer to the result analysis section for details about the assessment*).

4.3. Ethics and Safety Consideration

As discussed earlier, before taking part in the survey, the participants were provided with a participant information sheet, a General Data Protection Regulation (GDPR) privacy notice, and an informed consent form to fill out (Appendix B–D). Based on the information provided through these documents, they made their decisions about participating (or not participating) in the research project. Those agreeing to participate returned the signed informed consent form; thereafter, a Google survey form link was shared. Participation was purely voluntary, and those agreeing to participate were free to announce their exit without giving any reason. Personal data sharing was purely voluntary for future follow-up. For follow-up, a new participant information sheet and an informed consent form were to be shared (Appendix E and F), but the follow-up session did not take place. Only the research project's principal investigator had access to the research data, which included Likert scale values and personal information. To make the survey more comfortable and less stressful for participants, they were given the flexibility to complete it in one sitting or in portions over a week. Because the entire process could be finished online from the convenience of the participant's home or place of business, there were no concerns of physical harm. The study data were kept in safe storage and password-protected. A password was also required to access the data on the workstation. The research data were saved on the university's cloud storage using the OneDrive file hosting service per the research protocol because it does not contain any personal information.

5. Result Analysis

The two steps of the PLS-SEM model of SEM assessment are Measurement Model Assessment and Structural Model Assessment [35,36]. The process of assessing measurement models includes evaluating indicator reliability (Table 3), discriminant validity (Table 4), convergent validity (Table 3), and internal consistency reliability (Table 3). If the Average Variance Extracted (AVE) for each latent variable is more than 0.50, the measurement model is said to have convergent validity. If, according to the Fornell–Larcker Criterion, the AVE square root of each latent variable is higher than the correlation of that variable with other latent variables, then the model has discriminant validity (Table 4). According to research disseminated in [29], if the indicator loading is more than 0.708, the measurement model has indicator reliability; if the rho A reliability coefficient is more than 0.70, it has internal consistency reliability (Table 3). The structural model evaluation is completed following the measurement model's successful validation (Tables 5 and 6).

The assessment of all endogenous latent variables' coefficients of determination is conducted through structural model evaluation, which signifies the percentage of the dependent latent variable's variation that can be predicted by the independent latent variables (Table 7). Furthermore, a bootstrapping approach is used to compute the path coefficients, which indicate the degree of correlation between two latent variables in a structural model to determine their significance. The empirical t and p values are calculated at predefined significance thresholds for all path coefficients. A 95% confidence level, or $\alpha = 0.05$, is considered in the present study. The path coefficients are significant if T

Statistics is greater than 1.96 for all path coefficient values and the p -value in both the outer and inner models is less than 0.05 (Tables 5 and 6).

Table 3. Measurement model validity and reliability indicators.

Latent Variables	Indicators	Indicator Loading	rho_A	AVE	Validity (Okay?)	Reliability (Okay?)
Social factors (SF)	SF1	0.80	0.86	0.60	Yes	Yes
	SF2	0.71				
	SF3	0.73				
	SF4	0.81				
	SF5	0.78				
	SF6	0.82				
Domain experience (DE)	DE1	0.75	0.81	0.68	Yes	Yes
	DE2	0.82				
	DE3	0.90				
Technological familiarity (TF)	TF1	0.70	0.78	0.55	Yes	Yes
	TF2	0.72				
	TF3	0.81				
System quality (SQ)	SQ1	0.80	0.83	0.64	Yes	Yes
	SQ2	0.71				
	SQ3	0.77				
	SQ4	0.88				
	SQ5	0.79				
	SQ6	0.85				
	SQ7	0.70				
	SQ8	0.84				
	SQ9	0.75				
	SQ10	0.86				
Training and support (TS)	TS1	0.82	0.71	0.59	Yes	Yes
	TS2	0.77				
	TS3	0.71				
Interaction convenience (IC)	IC1	0.80	0.77	0.58	Yes	Yes
	IC2	0.71				
	IC3	0.75				
	IC4	0.78				
Anthropomorphism (A)	A1	0.82	0.80	0.66	Yes	Yes
	A2	0.75				
	A3	0.87				
Perceived usefulness (PU)	PU1	0.88	0.85	0.65	Yes	Yes
	PU2	0.78				
	PU3	0.81				
	PU4	0.82				
	PU5	0.74				
	PU6	0.80				

Table 3. Cont.

Latent Variables	Indicators	Indicator Loading	rho_A	AVE	Validity (Okay?)	Reliability (Okay?)
Perceived ease of use (PEU)	PEU1	0.962	0.82	0.74	Yes	Yes
	PEU2	0.86				
	PEU3	0.75				
	PEU4	0.82				
	PEU5	0.92				
	PEU6	0.84				
Perceived enjoyment (PE)	PE1	0.82	0.81	0.62	Yes	Yes
	PE2	0.78				
	PE3	0.77				
Emotions (E)	E1	0.90	0.73	0.75	Yes	Yes
	E2	0.85				
	E3	0.77				
	E4	0.82				
	E5	0.95				
	E6	0.88				
Switching intentions (SI)	SI1	0.82	0.73	0.77	Yes	Yes
	SI2	0.91				
	SI3	0.90				

Table 4. Discriminant validity (as per the Fornell–Larcker Criterion).

	SF	DE	TF	SQ	TS	IC	A	PU	PEU	PE	E	SI
SF	0.78											
DE	0.56	0.83										
TF	0.45	0.69	0.74									
SQ	0.63	0.77	0.53	0.80								
TS	0.44	0.53	0.62	0.54	0.77							
IC	0.39	0.62	0.41	0.73	0.74	0.76						
A	0.62	0.41	0.72	0.66	0.62	0.52	0.81					
PU	0.56	0.73	0.57	0.45	0.49	0.61	0.65	0.81				
PEU	0.59	0.72	0.46	0.71	0.71	0.70	0.79	0.37	0.86			
PE	0.44	0.57	0.38	0.62	0.58	0.49	0.68	0.61	0.41	0.79		
E	0.51	0.36	0.28	0.21	0.76	0.68	0.39	0.68	0.56	0.52	0.86	
SI	0.48	0.48	0.70	0.79	0.16	0.72	0.60	0.46	0.77	0.43	0.66	0.88

The validity and reliability of the measurement model are demonstrated by Tables 3 and 4. The model's convergent validity, discriminant validity, internal consistency reliability, and indicator reliability all contribute to its successful validation. The AVE is higher than 0.50, the indicator loading is more than 0.708, the rho_A reliability coefficient is more than 0.70, and the AVE square root of each latent variable is higher than the correlation of that variable with other latent variables.

Table 5. T value of hypotheses after bootstrapping.

Hypothesis Number	Hypothesis	β Value	T Value	p Value	Hypothesis Testing Outcome
H1	Social factors (SF) → Perceived usefulness (PU)	0.25	2.00	0.046	Supported
H2	Social factors (SF) → Perceived ease of use (PEU)	0.18	2.98	0.027	Supported
H3	Social factors (SF) → Perceived enjoyment (PE)	0.22	1.97	0.022	Supported
H4	Domain experience (DE) → Perceived usefulness (PU)	0.30	2.52	0.022	Supported
H5	Domain experience (DE) → Perceived ease of use (PEU)	0.15	3.18	0.039	Supported
H6	Domain experience (DE) → Perceived enjoyment (PE)	0.28	2.31	0.033	Supported
H7	Technology experience (TE) → Perceived usefulness (PU)	0.21	2.69	0.032	Supported
H8	Technology experience (TE) → Perceived ease of use (PEU)	0.17	2.01	0.031	Supported
H9	Technology experience (TE) → Perceived enjoyment (PE)	0.25	2.13	0.041	Supported
H10	System quality (SQ) → Perceived usefulness (PU)	0.35	2.78	0.013	Supported
H11	System quality (SQ) → Perceived ease of use (PEU)	0.26	4.15	0.03	Supported
H12	System quality (SQ) → Perceived enjoyment (PE)	0.32	2.53	0.017	Supported
H13	Training and support (TS) → Perceived usefulness (PU)	0.19	2.29	0.044	Supported
H14	Training and support (TS) → Perceived ease of use (PEU)	0.16	3.65	0.019	Supported
H15	Training and support (TS) → Perceived enjoyment (PE)	0.20	3.27	0.003	Supported
H16	Interaction convenience (IC) → Perceived ease of use (PEU)	0.23	2.02	0.047	Supported
H17	Interaction convenience (IC) → Perceived enjoyment (PE)	0.18	2.09	0.022	Supported
H18	Anthropomorphism (A) → Perceived usefulness (PU)	0.27	2.37	0.026	Supported
H19	Anthropomorphism (A) → Perceived ease of use (PEU)	0.14	3.56	0.017	Supported
H20	Anthropomorphism (A) → Perceived enjoyment (PE)	0.26	2.11	0.019	Supported
H21	Perceived usefulness (PU) → Positive emotions (E)	0.24	2.15	0.039	Supported
H22	Perceived ease of use (PEU) → Positive emotions (E)	0.19	1.99	0.041	Supported
H23	Perceived enjoyment (PE) → Positive emotions (E)	0.22	1.97	0.026	Supported
H24	Emotions (E) → Switching intentions (SI)	0.29	2.31	0.023	Supported

Table 6. Outer loading.

Indicator	T Value	p-Value	Significant?
SF1 ← Social factors (SF)	2.12	0.043	Yes
SF1 ← Social factors (SF)	2.07	0.046	Yes
SF1 ← Social factors (SF)	2.16	0.036	Yes
SF1 ← Social factors (SF)	2.45	0.045	Yes
SF1 ← Social factors (SF)	1.98	0.035	Yes
SF1 ← Social factors (SF)	2.18	0.047	Yes
DE1 ← Domain experience (DE)	2.41	0.025	Yes
DE2 ← Domain experience (DE)	1.95	0.049	Yes
DE3 ← Domain experience (DE)	3.21	0.047	Yes
TE1 ← Technology experience (TE)	2.07	0.040	Yes
TE2 ← Technology experience (TE)	2.15	0.041	Yes
TE3 ← Technology experience (TE)	1.94	0.049	Yes
SQ1 ← System quality (SQ)	3.37	0.030	Yes
SQ2 ← System quality (SQ)	3.01	0.043	Yes
SQ3 ← System quality (SQ)	2.13	0.047	Yes
SQ4 ← System quality (SQ)	1.98	0.048	Yes
SQ5 ← System quality (SQ)	2.25	0.038	Yes
SQ6 ← System quality (SQ)	2.03	0.041	Yes
SQ7 ← System quality (SQ)	2.40	0.022	Yes
SQ8 ← System quality (SQ)	3.95	0.048	Yes
SQ9 ← System quality (SQ)	2.30	0.035	Yes
SQ10 ← System quality (SQ)	1.98	0.045	Yes
TS1 ← Training and support (TS)	3.23	0.039	Yes
TS2 ← Training and support (TS)	2.11	0.038	Yes
TS3 ← Training and support (TS)	2.17	0.042	Yes
IC1 ← Interaction convenience (IC)	2.08	0.049	Yes
IC2 ← Interaction convenience (IC)	2.21	0.045	Yes
IC3 ← Interaction convenience (IC)	1.98	0.044	Yes
IC4 ← Interaction convenience (IC)	1.99	0.041	Yes
A1 ← Anthropomorphism (A)	2.28	0.036	Yes
A2 ← Anthropomorphism (A)	1.95	0.044	Yes
A3 ← Anthropomorphism (A)	2.10	0.034	Yes
PU1 ← Perceived usefulness (PU)	2.60	0.018	Yes
PU2 ← Perceived usefulness (PU)	2.14	0.032	Yes
PU3 ← Perceived usefulness (PU)	2.40	0.022	Yes
PU4 ← Perceived usefulness (PU)	1.97	0.041	Yes
PU5 ← Perceived usefulness (PU)	2.19	0.045	Yes
PU6 ← Perceived usefulness (PU)	1.97	0.042	Yes
PEU1 ← Perceived ease of use (PEU)	2.18	0.047	Yes
PEU2 ← Perceived ease of use (PEU)	2.42	0.043	Yes
PEU3 ← Perceived ease of use (PEU)	2.08	0.049	Yes

Table 6. Cont.

Indicator	T Value	p-Value	Significant?
PEU4 ← Perceived ease of use (PEU)	1.99	0.043	Yes
PEU5 ← Perceived ease of use (PEU)	2.30	0.035	Yes
PEU6 ← Perceived ease of use (PEU)	2.77	0.023	Yes
PE1 ← Perceived enjoyment (PE)	2.22	0.038	Yes
PE2 ← Perceived enjoyment (PE)	2.29	0.019	Yes
PE3 ← Perceived enjoyment (PE)	2.05	0.050	Yes
E1 ← Emotions (E)	2.12	0.043	Yes
E2 ← Emotions (E)	2.75	0.022	Yes
E3 ← Emotions (E)	2.20	0.040	Yes
E4 ← Emotions (E)	1.97	0.047	Yes
E5 ← Emotions (E)	2.28	0.036	Yes
E6 ← Emotions (E)	2.19	0.022	Yes
SI1 ← Switching intentions (SI)	2.45	0.025	Yes
SI1 ← Switching intentions (SI)	2.20	0.017	Yes
SI1 ← Switching intentions (SI)	2.35	0.030	Yes

Table 7. R² of the endogenous latent variables of the structural equation model.

Constructs	R ²	Outcome	Contributors to R ²
Switching intentions (SI)	0.74	Substantial explanatory power as 74% of variance is explained by the variable emotions.	Emotions
Emotions (E)	0.57	Moderate explanatory power as 57% of variance is explained by three variables together, i.e., perceived usefulness, perceived ease of use, and perceived emotions.	Perceived usefulness, perceived ease of use, and perceived emotions.

The computed p and t values are displayed in Table 5, which signifies that all 24 hypotheses (H1 to H24) are supported because the p values for each hypothesis are less than 0.05 and the t values are larger than 1.96. The results indicate that the social factor is correlated with perceived usefulness ($\beta = 0.25$, $p = 0.046$, $t = 2.00$, supporting H1), perceived ease of use ($\beta = 0.18$, $p = 0.027$, $t = 2.98$, supporting H2), and perceived enjoyment ($\beta = 0.22$, $p = 0.022$, $t = 1.97$, supporting H3). Additionally, domain experience is correlated with perceived usefulness ($\beta = 0.30$, $p = 0.022$, $t = 2.52$, supporting H4), perceived ease of use ($\beta = 0.15$, $p = 0.039$, $t = 3.18$, supporting H5), and perceived enjoyment ($\beta = 0.28$, $p = 0.033$, $t = 2.31$, supporting H6). Furthermore, technology experience is correlated with perceived usefulness ($\beta = 0.21$, $p = 0.032$, $t = 2.69$, supporting H7), perceived ease of use ($\beta = 0.17$, $p = 0.031$, $t = 2.01$, supporting H8), and perceived enjoyment ($\beta = 0.25$, $p = 0.041$, $t = 2.13$, supporting H9). Moreover, system quality is correlated with perceived usefulness ($\beta = 0.35$, $p = 0.013$, $t = 2.78$, supporting H10), perceived ease of use ($\beta = 0.26$, $p = 0.03$, $t = 4.15$, supporting H11), and perceived enjoyment ($\beta = 0.32$, $p = 0.017$, $t = 2.53$, supporting H12). Additionally, training and support is correlated with perceived usefulness ($\beta = 0.19$, $p = 0.044$, $t = 2.29$, supporting H13), perceived ease of use ($\beta = 0.16$, $p = 0.019$, $t = 3.65$, supporting H14), and perceived enjoyment ($\beta = 0.20$, $p = 0.003$, $t = 3.27$, supporting H15). Furthermore, interaction convenience is correlated with perceived ease of use ($\beta = 0.23$, $p = 0.047$, $t = 2.02$, supporting H16).

and perceived enjoyment ($\beta = 0.18, p = 0.022, t = 2.09$, supporting H17). Moreover, anthropomorphism is correlated with perceived usefulness ($\beta = 0.27, p = 0.026, t = 2.37$, supporting H18), perceived ease of use ($\beta = 0.14, p = 0.017, t = 3.56$, supporting H19), and perceived enjoyment ($\beta = 0.26, p = 0.019, t = 2.11$, supporting H20). Additionally, perceived usefulness is correlated with positive emotions ($\beta = 0.24, p = 0.039, t = 2.15$, supporting H21). Perceived ease of use is correlated with positive emotions ($\beta = 0.19, p = 0.041, t = 1.99$, supporting H22). Perceived enjoyment is correlated with positive emotions ($\beta = 0.22, p = 0.026, t = 1.97$, supporting H23). Finally, positive emotions are correlated with switching intentions ($\beta = 0.29, p = 0.023, t = 2.31$, supporting H24).

According to Table 6, there is statistical significance in the relationships between the latent variables and indicators in the measurement model. This is because p -values are less than 0.05 and the t -value for all paths between indicators and latent variables is more than 1.96. Finally, the values of the coefficient of determination (R^2) for some of the endogenous variables are displayed in Table 7. The R^2 for the switching intention is 0.74, which means that 74% of variance in this variable can be explained by emotions, which is considered substantial explanatory power or strong explanatory power. The value of R^2 for the endogenous variable emotion is 0.57, which means that 57% of variance in this variable can be explained by perceived usefulness, perceived ease of use, and perceived emotions together, which is considered moderate explanatory power.

The hypothesis testing of the association between technology adoption and four control variables is highlighted in Table 8.

Table 8. Hypothesis testing (control variables).

Hypothesis Number	Hypothesis	β Value	T Value	p -Value	Results
H25	Entrepreneur's gender (G) \rightarrow Switching intentions (SI)	0.089	0.789	0.636	Not significant
H26	Entrepreneur's age (AG) \rightarrow Switching intentions (SI)	−0.203	0.832	0.549	Not significant
H27	Entrepreneur's working experience (WAE) \rightarrow Switching intentions (SI)	0.049	2.02	0.029	Supported
H28	Entrepreneur's educational level (EL) \rightarrow Switching intentions (SI)	0.182	1.412	0.625	Not significant

The control variable entrepreneur's gender does not correlate with the switching intentions ($\beta = 0.089, p = 0.636, t = 0.789$), which means that H25 is not significant. Additionally, the entrepreneur's age and educational qualifications do not have a correlation with the switching intentions ($\beta = -0.203, p = 0.549, t = 0.832, \beta = 0.182, p = 0.625, t = 1.412$), which is not consistent with H26 and H28. However, the entrepreneur's working experience does correlate with the switching intentions ($\beta = 0.049, p = 0.029, t = 2.02$), which supports H27.

6. Discussion and Study Contributions

The pre-perception and perception stage, the assessment Stage, and the outcome stage are the three stages in the technology adoption decision making of the entrepreneurs. Many factors influence the decision making in each phase, which are empirically validated in this research study.

It turns out that social networks significantly influence how entrepreneurs perceive Generative AI technology. Entrepreneurs are more likely to think the same way about technology if others in their social network also find it valuable. Entrepreneurs are more

comfortable experimenting with this new technology if their social network holds positive opinions about the technology. People frequently exhibit resistance when they become aware of new technologies or encounter problems in using these technologies initially or as these technologies evolve. However, if members of their social network are competent in using these technologies, they get over this resistance and receive assistance in adopting these technologies. The social network's continuous guidance not only piques entrepreneurs' curiosity in exploring how technology works but also aids in their comprehension of the full potential of technology.

Social factors have an impact that goes beyond perceived usefulness. It is interesting to note that entrepreneurs discover that their social network experiences influence not only how valuable they perceive Generative AI technology to be but also how easy and enjoyable it is to use. This is in line with the results of the previous studies that found that social influence positively impacts performance expectancy (a *similar concept to perceived usefulness defined as the level of benefits expected from the AI technology*) [12,21] and negatively impacts effort expectancy (a *similar but opposite concept to perceived ease of use. The authors of [12] define it as the degree of difficulty associated with the use of AI technology*). Positive knock-on effects result from knowing that someone in their network finds the technology entertaining and easy to use. This lowers obstacles and gives the impression that technology is more approachable and even enjoyable.

One of the quotes submitted by an anonymous entrepreneur at the time of filling out the questionnaire mentions: "Initially, I was unsure what the ChatGPT could accomplish for my business. My business associate introduced me to this technology one day and assisted me in getting started with it. I utilized this application for straightforward activities like writing content for LinkedIn posts and researching Latin American cultural norms—my company is currently focused on expanding into this region. This technology is interesting and user-friendly, in my opinion. I did feel compelled to increase the amount of time I spent interacting with it because I was having fun".

The connection between entrepreneurs and Generative AI is better established owing to the entrepreneur's expertise in the industry and up-to-date knowledge (or even elementary knowledge) about this technology. Entrepreneurs who possess extensive industry knowledge and some awareness of the potential of Generative AI are in a unique position. This knowledge serves as a compass, helping people to see how this technology can improve current business procedures and provide real financial benefits. Their perceptions of the technology's utility, use, and enjoyment increase along with their level of technological understanding, which makes it possible to find its fit with business needs grounded in rich industrial knowledge. One of the reasons to give technology a try is to see if the technology could be a possible solution to current business problems. The outcome of the technology is matched with the outcomes expected by the entrepreneurs grounded in their industry expertise. As experience with technology increases, there is an increase in capability of using the technology, leading to the development of perceptions of usefulness, ease of use, and enjoyment.

One of the quotes submitted by an anonymous entrepreneur at the time of filling out the questionnaire states: "I have extensive experience in the field of education, and my business offers cutting-edge solutions to the knowledge sector. I had a blend of experiences as an academic, researcher, and business owner. My team used ChatGPT to generate ideas for inspiring students in rural sectors to take part in prototype sessions. We thought some of the suggestions provided by the technology worth investigating and combining them with other ideas and our expertise to produce a feasible solution, based on our prior experiences in rural education".

One important component of technology adoption is illuminated by the notion that entrepreneurs are more likely to experiment with technology when they have some familiarity with it, either from personal or professional encounters. Having experience with a certain technology seems to give entrepreneurs more confidence and push them to try new things. Their comprehension of the technology is improved by this firsthand experience,

which also profoundly influences their perceptions of its usefulness, ease of use, and overall enjoyment. It is like getting a head start; business owners who have used the technology before feel more comfortable with its workings, which creates a favorable impression that affects not just how the technology works but also how they perceive it overall. They start experimenting with the technology for more complex business queries and processes.

One of the quotes submitted by an anonymous entrepreneur at the time of filling out the questionnaire states: “My son used to talk about this technology, so I was somewhat aware of it. I’ve used it with him for other small jobs like creating content for my Facebook posts. This encouraged me to give this technology a try for other too-repetitious business operations, like sending thank-you emails to stakeholders. This encouraged me even more to experiment with the technology for more difficult jobs, including writing software code fragments, which I use to modify owing to my experience in the software sector”.

High quality has significant ramifications and helps entrepreneurs get over their early reservations about new technologies. Entrepreneurs are more likely to adopt new technologies that stand out in terms of overall quality, performance, accuracy, maintainability, and accessibility. This outstanding quality not only alleviates their concerns but also encourages them to be more open to trying new things with the technologies. Entrepreneurs discover that the technology is more appropriate to meet their business needs when they conduct more thorough experimentation. Their opinions are essentially shaped positively by this positive experience, which results in a positive opinion of the technology’s usefulness, ease of use, and overall enjoyment.

Essentially, the quality of technology becomes a crucial component in the entrepreneur’s journey, impacting all aspects of their interactions with the technology and aiding in adoption. With a great understanding of the industry, the responses given by the technology can be immediately evaluated by the entrepreneur, motivating them to experiment with it for more complex business operations. High values of the quality factors enhance entrepreneurs’ trust in the technology, leading to more interactions with it. This is important, as entrepreneurs will adopt Generative AI technology more for knowledge-intensive tasks to solve business problems, such as, for instance, gathering market-related information or designing customer interview questions. This is in line with the results of the previous study, which found that task–technology fit (*the ability of the technology to help users complete their tasks, as Generative AI is a task-oriented device*) impacts the perceived competence of the technology (*the perception of the users that Generative AI has the capability to solve problems*) [14]. The authors of [14] also reported that utilitarian motivation (*the motivation of the users to use the technology because they believe that it will help them to complete their tasks more effectively*) positively impacts users’ perceived competence of the AI technology. The ability of technology to solve a portfolio of tasks effectively is grounded in its quality.

A technology’s quality has a significant impact on an entrepreneur’s motivation to experiment more with the technology to better understand its capabilities, limitations, and limits to use it as a tool to solve challenging business problems regularly. The authors of [22] reported that some of the biggest challenges to adopting the ChatGPT by healthcare workers (users) are concerns around the technology’s accuracy and reliability and the source of information.

One of the quotes submitted by an anonymous entrepreneur at the time of filling out the questionnaire states: “This technology, in my opinion, is a useful knowledge partner. It may be utilized anywhere, at any time, and from any location. It responds to queries in a matter of milliseconds. Without a doubt, technology produces high-quality outcomes, but to better adapt the results, business operations, and industry knowledge are crucial. Still, this is enough to keep experimenting with this technology because it’s practical for businesses, easy to use, and enjoyable to use”.

Through instructional resources like YouTube videos, internal training programs, and guidelines, entrepreneurs who are reluctant to adopt technology can overcome their resistance and discover a potent path for transformation. These resources become crucial tools for entrepreneurs who struggle with technological hesitation because they provide

organized and approachable methods for demystifying complicated technologies. A significant change takes place as they interact with the training materials: resistance gives way to understanding, enabling business owners to employ technology to fulfill their objectives. With their newfound understanding, the previously reluctant entrepreneurs now see technology as more beneficial, user-friendly, and even enjoyable. This highlights the critical role that focused training materials play in changing people's perceptions and motivating them to experiment more with the technology (and its subsequent versions). These materials also help entrepreneurs gain skills in using technology at advanced levels and address the issues that they may be facing in using the technology.

One of the quotes submitted by an anonymous entrepreneur at the time of filling out the questionnaire mentions: "I made a lot of errors when constructing the prompts, thus my first experience with this technology was not great. Subsequently, I came across several intriguing YouTube videos and websites with instructions on how to utilize the technology to create the prompts. Understanding the technology through training materials is crucial, but constant engagement with it will lead to perfection".

A user-friendly interface facilitates simplified interactions and makes technology use easier for entrepreneurs. Task navigation is made quick and easy with this user-friendly design, which also lowers the learning curve. Entrepreneurs discover that technology integrates effortlessly into their workflows, resulting in greater user satisfaction. A key component that turns technology from a possible obstacle into a priceless and smoothly integrated instrument in their commercial operations is a user-friendly interface. One of the quotes submitted by an anonymous entrepreneur at the time of filling out the questionnaire states: *"Because this technology is so easy to use and interact with, I would really like to use it more"*.

The degree to which entrepreneurs provide Generative AI systems with human-like traits is known as anthropomorphism. The ability of the Generative AI to produce responses in human-like language and conduct natural-language conversations with users has a significant impact on their assessment of the usefulness of technology. This makes user interactions more analogous to human discussions. When entrepreneurs engage with this technology, they may give it human characteristics, viewing it as a conversational partner that provides human-like responses rather than just a utilitarian tool. These technologies' perceived usefulness is increased, and a more instinctive and natural engagement is made possible by their capacity for human-like communication. With its ability to answer in natural language in a manner akin to that of a human, Generative AI platforms like ChatGPT provide two-way communication that appeals to entrepreneurs. Their sense of the technology's use is positively impacted by this natural and relatable interaction, which makes it seem more approachable. Additionally, entrepreneurs have a greater feeling of enjoyment due to the technology's human-like reaction because they find gratification in interacting with a system.

Furthermore, entrepreneurs find gratification in interacting with a system that reflects human relevance and responsiveness, which is facilitated by the technology's human-like responsiveness. Beyond simple functionality, ChatGPT's smooth, natural communication style offers a distinctive and delightful user experience that influences how they incorporate and value Generative AI in their ventures. This is in contradiction to the results of a previous study that anthropomorphism positively impacts users' perceptions of the technology's benefits and reduces their perceptions of the amount of effort to be invested to use the technology [21].

One of the quotes submitted by an anonymous entrepreneur at the time of filling the questionnaire expresses: "It's like having a two-way discussion with a human when using ChatGPT. Even though we use technology carefully, we are drawn to it more because of the way it allows us to communicate".

The combination of all of these elements gives entrepreneurs the ability to start investigating Generative Artificial Intelligence solutions. These entrepreneurs have a range of expertise and awareness of these technologies from none at all to some degree. These

elements encourage entrepreneurs to experiment with Generative AI technologies, learn about them, and employ them first for basic tasks. As a result of constant experimentation with these technologies, one's familiarity with them grows, reducing the learning curve and building confidence in the technology. The favorable perspectives developed during the pre-perception and perception stage as well as the assessment phase serve as the foundation for the ongoing use of Generative AI technology and other solutions.

The combination of these favorable factors enhances the Generative AI technology's perceived usefulness, ease of use, and enjoyment. These aspects, in turn, shape the overall perceived emotions about technology. The adoption of Generative AI in business operations is accelerated when entrepreneurs have positive emotions about the technology. Conversely, unfavorable feelings could prompt business owners to investigate other options or turn to human services. The decision-making process is heavily influenced by this emotional connection, which is built incrementally by going through multiple stages, i.e., pre-perception and perception and assessment stages, with multiple factors impacting the stages.

One of the quotes submitted by an anonymous entrepreneur at the time of filling out the questionnaire expresses: "My social network exposed me to ChatGPT. I experimented with it on some easy jobs and was astounded by how rapidly it produced useful outcomes. This sparked my curiosity about these kinds of apps as well. I'm always interested in learning about new technologies, like Google Bard. My favorable experiences with technology increased my desire to utilize it more and elevated my perceptions of its utility and simplicity. The decision to gradually adopt the technology is undoubtedly influenced by these favorable feelings. Incremental because decisions about full-scale adoption are taken only after the technology has been used repeatedly and continuously on a range of complicated business tasks".

This study's findings point to a distinctive profile of entrepreneurs engaged in startups that develop cutting-edge goods and services for a range of markets. Notably, this group of entrepreneurs has a minimum of a Bachelor's degree requirement and is distinguished by a high degree of expertise. Interestingly, though, this study finds that some control variables—namely, the age of the entrepreneur, the gender, and the educational attainment levels—have no appreciable impact on the switching intentions, i.e., deciding to adopt alternative solutions. This is in contradiction with the findings of previous research that age has an impact on user willingness to reject ChatGPT [21].

Usually, the entrepreneurs operating in delivering innovative products or services have some formal education. For instance, students studying at a university may start their startups to commercialize their research products. Continuous experience as an entrepreneur in a fluctuating market builds their problem-solving skills, practical learning, agility to respond to environmental changes, and outcome-oriented mindset. These skills shadow the traditional demographic variables' influence on technology-switching intentions. This signifies that entrepreneurs' switching decisions are not dependent on their age, education level, or gender. On the contrary, prior work experience in an entrepreneurial role is negatively associated with switching intentions. This means that entrepreneurs driven by their experience are less prone to switch to other alternative technologies. One reason could be that expertise with existing technologies is the strategic asset of startups. Entrepreneurs prefer to leverage the technology's acceptability among startup team and their expertise with existing Generative AI technologies rather than simply making the decision to switch. While entrepreneurs experiment with emerging technologies, they do not intend to replace them with existing technologies they are using right away. This means that they will critically evaluate current technology with respect to their experiences with experimentation with the emerging technologies. In the absence of the integration of suitable technology, the entrepreneurs incrementally adopt the valuable technologies and switch to alternatives non-strategically. There was a rise in the use of digital technology, such as digital platforms, particularly during the pandemic [37], and this trend is probably going to continue in the aftermath [38]. The growing use of digital technologies has encour-

aged entrepreneurs to test new technologies to become more knowledgeable about them, better grasp their value, and be able to match them to their business challenges. Additionally, the pandemic gave entrepreneurs the chance to transition to digital entrepreneurship and offer cutting-edge market solutions [39]. Growing experience with the technologies helped to overcome entrepreneurs' resistance to experimenting with new technologies and reduced resistance to experimenting with alternative technologies. Because the startup's experience with current technology is a valuable strategic asset, the choice to replace the technologies the team is embracing is typically made strategically and in the most wanting situations, including, for instance, extraordinary functionalities, extreme issues with the current technology, and significant business benefits.

6.1. Theoretical Contributions

This is the first research study to empirically validate Generative AI technology adoption from the perspective of entrepreneurs. The results empirically evaluate and establish the direction and strength of the correlations among the adoption factors. The results contribute to the body of knowledge about technology adoption theory in the context of entrepreneurship. The results indicate that Generative AI adoption happens in three stages, namely, the pre-perception and perception stage, the assessment Stage, and the outcome stage. Social factors, domain experience, technology experience, system quality, training and support, interaction convenience, and anthropomorphism impact the pre-perception and perception Phase. Perceived usefulness, perceived ease of use, and perceived enjoyment impact the assessment phase, and these factors together generate emotions towards the technology, which triggers the outcome stage. The outcome stage finally results in switching intentions, i.e., adoption of technology, use of human expertise, or switching to alternative technologies. Positive contributions from all factors result in successful adoption of the technology.

Apart from contributing to Generative AI technology acceptance theory, this research study extends previous research studies conducted to investigate the adoption of AI technologies by adding new adoption variables and adoption stages. In previous research, AI technology adoption has been investigated from the perspectives of students using the TAM model [15–18], the UTAT model [19,20], and the AIDUA model [21] (Ma and Huo, 2023). The adoptions of technology were empirically explored from the perspectives of students [15–19], knowledge workers [20], customers [21], and healthcare professionals [22]. This research study not only provides an empirically validated Generative AI adoption model from the entrepreneur's perspective but also adds to the body of knowledge that entrepreneur control variables age, gender, and education level do not impact switching intentions to alternative technologies or solutions. It is the entrepreneur's experience in operating the startup (*one of the control variables*) that plays a significant role in determining whether they embrace Generative AI technology or switch to the alternatives.

6.2. Practical Contributions

This research's empirical findings have important practical ramifications for entrepreneurs who want to use Generative AI technology, particularly those operating within resource-constrained environments. These ramifications offer practical guidance on how they can successfully manage the adoption process.

(a) Leverage a collaborative ecosystem

Entrepreneurs ought to participate actively in cooperative environments, such as chambers of commerce, accelerators, foreign embassies, libraries, and incubators. In addition to networking opportunities, these platforms provide mentorship, affordable training programs, and a friendly atmosphere that can assist entrepreneurs in exploring technology and overcoming their resource constraints. This is due to this research study's identification of how social networks, industry familiarity, training and support, domain expertise, and industry expertise enhance entrepreneurs' evaluations of the usefulness, enjoyment, and ease of use of technology. These elements enable individuals to get over

their reluctance to try new things with technology, which permits them to investigate it practically and learn about its potential for problem solving in the world of business. For instance, entrepreneurs lacking domain expertise could benefit from their social network's active use of the technology and the domain expertise of some of the social network's members in exploring the technology, thus enhancing their curiosity to experiment with technologies and incrementally building competencies to find their match with business needs. The innovation ecosystem provides opportunities for open innovation by offering guidance, expertise, and motivation for entrepreneurs in the adoption process. For instance, they could offer training support to entrepreneurs to help them trigger ChatGPT with better prompts. This also helps entrepreneurs to evaluate the technology's quality from functional and non-functional perspectives.

(b) Collaboration with academic and public libraries

Obtaining educational materials and business support from public and university libraries can be an affordable way to learn the fundamentals of Generative AI and their applicability. To learn more without spending a lot of money, entrepreneurs could look at free or inexpensive courses, research papers, books, and practical advice. These educational establishments could provide entrepreneurs with industry knowledge, technology usage guidelines, and training. For entrepreneurs, libraries provide a wealth of tools, such as, for instance, AI tools [40], and services, including assistance with market research [41,42] and literature reviews [40]. Their familiarity with market research and their comprehension of technology will enable them to impart to entrepreneurs their practical knowledge of the limitations and usefulness of technology for business tasks for industry.

(c) Focusing on intuitive design and smoother interactions

The findings of this study indicate that in the context of Generative Artificial Intelligence, interaction convenience favorably affects perceived enjoyment and perceived ease of use. Entrepreneurs should prioritize user-friendly interfaces and seamless interactions when choosing technologies for experimentation, as this will require less effort, and the experience gained (*even with failed experimentations*) will be useful for future experiments with various technologies. This means that they ought to concentrate on experimenting with technologies with user-friendly designs, ones that have a low learning curve, and ones that complement users' natural workflows. This focus on interaction convenience improves the user experience and facilitates a more seamless adoption process by lowering potential resistance and encouraging entrepreneurs and their teams to have a favorable attitude toward Generative AI.

(d) Focus on technologies with human-like characteristics

The discovery that anthropomorphism (A) positively impacts perceived usefulness, ease of use, and enjoyment holds significant practical implications for entrepreneurs venturing into Generative AI adoption. This suggests that entrepreneurs should seek technologies that possess human-like traits, as this characteristic enhances the perceived utility of the technology. They should select Generative AI solutions that offer natural-language interactions, human-like responses, and an overall user experience that aligns with human communication styles. Entrepreneurs can leverage these findings to prioritize technologies with anthropomorphic design elements, fostering a sense of ease of use and enjoyment among users. This also makes startup team training with the technology more seamless. Furthermore, it makes it easier to motivate the team to overcome their initial resistance towards the technology and engage in further curiosity-based experimentations with an array of technologies for fostering innovation. This also helps them to explore the technological capabilities to become aware of their quality. Support from innovation ecosystem actors and libraries can further enhance their perceptions of technology's quality aspects, thereby impacting perceptions of its utility, easiness, and overall enjoyment.

(e) Iterative experimentation approach

Adopting an iterative experimentation approach allows entrepreneurs to explore Generative AI gradually. By starting with simple business tasks and scaling based on insights gained, entrepreneurs can minimize upfront costs and build practical knowledge, aligning with their resource constraints. Entrepreneurs usually adopt the experimental approach to innovate their business model in the market. Experiences with market experimentations, support from the innovation ecosystem, and the entrepreneur's own experiences with the technology and industry will lead to better exploration of the technology and rational adoption decisions.

Entrepreneurs embarking on Generative AI adoption can strategically enhance their journey by intertwining key practical implications derived from the research findings. Actively participating in collaborative ecosystems, such as accelerators and chambers of commerce, opens avenues for networking, mentorship, and affordable training. Concurrently, leveraging support from foreign embassies and innovation ecosystems offers valuable guidance and motivation throughout the adoption process. Collaborating with academic and public libraries provides entrepreneurs with a cost-effective knowledge repository, offering educational materials, market research assistance, and industry insights. This together with entrepreneurs' own experiences could foster their abilities to streamline the adoption journey. Prioritizing intuitive design and interaction convenience (IC) fosters a seamless adoption experience, encouraging experimentation with user-friendly technologies. The positive impact of anthropomorphism underscores the importance of selecting technologies with human-like traits, facilitating team training, and motivating teams to overcome initial resistance. These factors raise initial curiosity and interest in the technologies, which encourages entrepreneurs to experiment more with them. This also helps them to evaluate the technology's quality and find its suitable applications in the business world. The results will help entrepreneurs to make adoption decisions based on their strengths and weaknesses, including, for instance, the availability of social networks with rich expertise in using technology, the availability of in-house (or in collaborative networks) domain and technological expertise, etc. For instance, if the entrepreneur wishes to experiment with a new technology, they can make this decision if they have experience with it or if their collaborative network is using it and could offer expertise. Experiences in experimentation enhance their dynamic capabilities to raise their abilities to experiment with the evolving AI technology spectrum that could offer value to ever-changing business needs.

The objective of this research is to investigate adoption from the perspective of the entrepreneurs, but this study can be replicated with other innovation ecosystem elements. The results apply to entrepreneurs, but the findings of this research hold substantial practical implications for various stakeholders, especially policymakers, academic and public libraries, and technology providers as well. Policymakers can leverage insights to formulate supportive frameworks that encourage the integration of ChatGPT technology in startups, helping them to meet their business needs within their resource constraints. Technology should enhance the adoption factors to boost adoption among entrepreneurs. For instance, considering the role of the entrepreneur's social network in making them aware and providing resources for exploring the technology, the technology provider can build an expert community around the technology, helping entrepreneurs to easily adopt the technology.

Academic and public libraries can play a pivotal role by facilitating knowledge dissemination and skill development related to ChatGPT adoption, contributing to a more informed entrepreneurial community. They could use the study findings to strategically adopt these technologies and then help entrepreneurs to adopt them or provide Generative-AI-based services to them. This could also help them to foster co-creation activities, thereby boosting the adoption of other emerging technologies and undertaking service innovations. This study provides insights to shape policies that align with the evolving technological landscape, thus promoting economic growth and competitiveness. Policymakers can leverage this research to facilitate a conducive environment for ChatGPT adoption, positioning their regions as hubs for transformative technological advancements. For instance, policy-

makers can frame supportive policies to make open collaboration feasible to strengthen the exchange of expertise leading to adoption, support AI-related regulations, and boost the environment for innovating with AI technologies. Overall, these practical implications bridge the gap between research and application, empowering policymakers, technology providers, and academic/public libraries to actively contribute to the successful integration of ChatGPT technology in startup ecosystems.

Examining the pragmatic factors that influence the adoption process becomes crucial as we dig deeper into comprehending the dynamics of technology adoption in entrepreneurial settings. Although the stages and factors influencing entrepreneurs' adoption of Generative AI technologies have been explained in the section above, it is important to place these findings in the context of the larger picture of real-world opportunities and challenges related to these technologies. We will look at some of the most important practical issues that come up when implementing Generative AI in startup ecosystems. From the degree of adoption and its effect on entrepreneurial tasks to regulatory considerations and ethical consequences, the wider range of issues with technology adoption is covered. The goal is to give entrepreneurs overcoming the challenges of incorporating AI into their ventures a thorough understanding of the nuances involved in the technology adoption process by addressing these practical factors associated with the nature of AI technologies.

(a) Extent of adoption

To what extent will Generative AI technologies be adopted in entrepreneurial settings? Startups operating in which industries or sectors will be more likely to adopt these technologies? Do the given adoption factors affect the decision to adopt equally for those operating in different industries? Ideally, all startups operate in a fluctuating environment with their liabilities of smallness and newness, offering innovative products in the market. The process of finding a repeatable and scalable business model depends on ongoing actions related to the business model's characteristics, such as knowledge development and hypothesis testing. The adoption factors for Generative AI technology are equally applicable to startups operating in different industries, but adoption patterns may differ. For example, startups in the health sector may have stronger motivation based on, for instance, stronger social impact and greater previous experience with the technology, to adopt the technology and use it ethically due to regulatory requirements.

(b) Impact on entrepreneurial tasks

What effects will the use of Generative AI technologies have on the tasks that entrepreneurs perform at different phases of their business ventures? Which entrepreneurial activity, once technology is adopted, will be the first to be automated? Will these technologies mostly improve effort investment, productivity, task completion speed, and quality of work, or will they also bring with them fresh challenges and complexities? The factors that may lead to entrepreneurs adopting technology are addressed by the adoption model. Starting small and scaling incrementally as expertise and knowledge with the technology increase is one strategy. The first set of tasks chosen for these experiments may be one whose results are readily verifiable (to verify the accuracy of Generative AI results). For example, this might include preliminary findings regarding possible foreign market demand based on Google market searches as criteria. As an alternative, the chosen tasks may be those that require effort but are less critical to the company, such as, for instance, simple coding or documentation. Innovation adoption factors and the ability to co-create with the innovation ecosystem will be key to addressing involved challenges. While AI technologies present chances for creativity and efficiency advantages, their careful integration and control are also necessary to optimize benefits and minimize hazards.

(c) Job dynamics within startups

The human resources of startups undertake multiple functional roles. Generative AI technology adoption is very likely not going to replace humans, but it will empower them to focus on higher-value tasks that call for creativity, analytical thinking, and emotional

intelligence. Technology, for example, will encourage human resources to acquire new competencies, such as identifying the beneficial applications of technology and verifying AI results, emphasizing the significance of upskilling and adapting to effectively utilize AI.

Furthermore, to provide significant insights and support well-informed decision making within startups, AI insights must be integrated into other sources of data and expertise. This method entails not just comprehending the potential of AI technology but also placing the results in the context of the organization's overarching objectives and strategy. A collaborative strategy where people and AI systems complement each other's strengths and talents is necessary for successful AI adoption within startups. Startups may make use of AI's potential to accelerate growth, enhance decision making, and add value for their stakeholders by using it as a tool for innovation and efficiency rather than as a substitute for human employment.

(d) Regulatory considerations for startups

Which legal frameworks and policies are in place to control how AI technologies are adopted and applied in startup ecosystems? How can business owners successfully manage these rules to reduce their regulatory load and promote innovation? For instance, using Generative AI output can have serious copyright violations, which could create legal troubles for startups. The lack of transparency makes Generative AI like a black box such that the technology's outcome cannot be traced back to its sources. This leads to a lack of trust in the authenticity and credibility of the information generated by the technology, especially when startups' business model innovation strongly depends on their ability to generate market information and validate the hypothesis. Will open-source AI boost entrepreneurial activities?

The European Union's (EU) AI law, for example, exempts models created solely for research and development and regulates AI based on its potential risk, meaning that it has minimal effect on research efforts [43]. The four risks connected to users' use of AI systems are outlined in the new rule. The regulation's overarching goal is to safeguard users' rights and interests while also making sure they understand how transparent AI systems are and that they can rely on the benefits they have to offer. The new regulation imposes conditions on the technology providers rather than on its users. Hence, considering that such a regulation will enhance transparency, trust, accountability, inclusivity, safety, ethical use, and privacy, this will be value-adding for the Generative AI users, including the entrepreneurs. As the AI act reached an agreement on 8 December 2023, it is yet to be converted to the EU law¹. This also ensures that the Generative AI technology will adhere to ethical implementation as it will ensure that AI systems are developed and deployed in a manner that upholds ethical principles and respects user rights, such as, for instance, privacy and lawful processing of personal data. It can also ensure the reduction of algorithmic bias as the regulation will promote AI openness and data explainability to its users.

However, as the provider of the AI-based system, the startups must adhere to the AI act by, for instance, fulfilling requirements depending on the risks they carry. Furthermore, being an SME, they can use the regulatory sandboxes to develop, test, and validate their AI innovations under less regulatory constraints before commercializing them in the markets. As a user of Generative AI technology and as a provider of innovative AI technology, this will have different implications for entrepreneurs.

7. Study Limitations and Future Recommendations

This study acknowledges several limitations that should be considered. First, the decision to refrain from explicitly investigating the impact of an entrepreneur's nationality or specific cultural background arises from the intricate and dynamic nature of entrepreneurial experiences. It was difficult to identify a single dominant culture amongst the mix of multiple cultures of each entrepreneur because of the possible mingling of several cultures that they may have experienced by living in or interacting with various nations (or regions) during their entrepreneurial journey. Because of this, it is more difficult to develop a consistent

framework for assessing how cultural influences affect the adoption of technology from the perspective of the entrepreneurs of global SMEs.

Second, although this study gathered demographic data on the continent where startups are located, it could have gone into more detail and may have missed certain local or regional aspects that might influence the adoption of new technologies across continents. Put differently, adoption variations across continents are not investigated in this research study, as the adoption of this technology is still a developing phenomenon.

Third, those taking part are startup entrepreneurs providing cutting-edge goods and services. This did not include the entrepreneurs of certain SMEs, such as restaurants or travel agencies, that provide non-innovative products and are therefore not regarded as startups. The same model can be empirically assessed in relation to small- and medium-sized enterprises offering non-innovative products. Furthermore, this study can be replicated in the context of innovation ecosystem actors, such as, for instance, libraries and accelerators, as open collaboration will boost experimentation and the adoption of technology among entrepreneurs.

8. Concluding Remarks

This research study contributes significantly to the understanding of the dynamics of Generative AI technology adoption from the distinct viewpoint of entrepreneurs. This research study has empirically validated the complex relationships between adoption determinants, offering significant contributions to the theory of technology adoption in the context of entrepreneurship.

The three-stage model that was identified—pre-perception and perception, assessment, and outcome—has been validated empirically. Important elements that have been discovered to have a major impact on the pre-perception and perception phase include social factors, domain experience, technology experience, system quality, training and support, interaction convenience, and anthropomorphism. These factors motivate entrepreneurs to experiment more with the technology, thereby building perceptions of its usefulness, perceived ease of use, and perceived enjoyment, three factors that in turn affect emotions toward the technology.

Our results suggest that these elements interact in a sophisticated way to produce the outcome stage, which is switching intentions. This phase includes a variety of options, such as utilizing human expertise, switching to other technologies, or implementing Generative AI technology. Adoption of technology depends on all of the elements mentioned above playing a beneficial role.

In addition to enriching the Generative AI technology acceptance theory, our research extends the existing literature by introducing new adoption variables and stages specific to entrepreneurship. Notably, this study disproves common beliefs by showing that among entrepreneurs, control variables like age, gender, and educational attainment had no appreciable effect on switching intentions. Rather, the experience factor of running businesses shows itself to be a crucial one. This study, taken as a whole, is essentially a major first step in the continuing conversation about the use of Generative AI technology in the entrepreneurial setting. Entrepreneurs can leverage their dynamic capacities to experiment with developing technologies effortlessly and rationally, thus leading to reasonable switching intentions by drawing on previous experiences of adopting similar technologies.

The practical ramifications of utilizing Generative AI technologies in entrepreneurial settings are inherent in their properties. For entrepreneurs to embrace AI-driven innovation, navigating these ramifications is crucial. These include regulatory environments, task dynamics, and industry-specific motivations. In today's changing business context, entrepreneurs can employ Generative AI as a revolutionary tool to enhance decision making, drive development, and create value. However, companies must recognize the need for ethical use, regulatory compliance, and adaptability.

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Institutional Review Board Statement: This research study is approved by the Institutional Review Board of Winning Scientific Management, Lisbon, Portugal, under protocol number 0823J. The research project is also approved by the University of Leicester Ethics Sub-Committee of Science & Engineering, Arts, Humanities and Law (research study design ID: 43400). The research project has also obtained clearance under the Academic Technology Approval Scheme (ATAS) of the UK Government's Foreign, Commonwealth, and Development Office (FCDO) dated 20 July 2023. This research was conducted in accordance with the research study protocol published in the *PLOS ONE* Journal. The detailed protocol outlining the methodology, ethical concerns, and procedures employed in this study can be found in the publication titled "Study Protocol for Factors Influencing the Adoption of ChatGPT Technology by Startups: Perceptions and Attitudes of Entrepreneurs", available at <https://doi.org/10.1371/journal.pone.0298427>.

Data Availability Statement: The data that support the findings of this study are not publicly available due to restrictions imposed by the agreements with the participants. Before providing informed consent, participants were assured that their individual data would not be shared beyond the research team. The research data will only be shared publicly in aggregated form and as anonymized quotes (*if quotes were shared by participants*). Furthermore, as outlined in our data management plan and ethical considerations, all collected data from Likert scale values and personal data (*if shared by participants*) will be securely and permanently deleted six months after the conclusion of the research study. For inquiries regarding the study or requests for specific analyses, please contact the corresponding author at his email address. While we are unable to share the raw data, we are committed to providing any additional information or clarification necessary for the replication of the study's results.

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Conflicts of Interest: The author declares no conflicts of interest.

Appendix A. (Questionnaire)²

Introduction

We thank you for agreeing to participate in the research project titled "*Factors Influencing the Adoption of ChatGPT Technology by Startups: Perceptions and Attitudes of Entrepreneurs*". The primary objective of this study is to ascertain the factors that impact the uptake of ChatGPT technology by startups, anticipate their influence on the triumph of companies, and offer pragmatic suggestions for various stakeholders, including entrepreneurs, and policymakers.

Per the research study protocol, you were provided with the University of Leicester's standard participant information sheet, General Data Protection Regulation (GDPR) privacy notice, and an informed consent form to fill out. The participant information sheet provides details about the research project, including its goals, potential risks, participation benefits, voluntary participation requirements, data confidentiality, specifications regarding any acquisition of personal data, safety measures, and contact information for any inquiries. This information document's goal is to assist potential participants in making an informed choice regarding whether to participate in the research project or not. If participants voluntarily provide their personal information for follow-ups in the future (*which is entirely voluntary*), the GDPR Privacy Notice is applicable. This document describes how the personal information that study participants provide to the project is collected and used. Participants must fill out, sign, and return the informed consent form to the researchers, indicating their willingness to take part in the study. As previously mentioned, the participating entrepreneurs will only receive the structured questions to fill out after obtaining their informed consent.

We thank you for agreeing to take part in the research project. Your participation is valuable for ensuring the success of the research project. The study's findings are

valuable for various stakeholders, for instance, Entrepreneurs, Policymakers, technology providers, researchers, and Institutions offering support for entrepreneurs like Academia, Incubators and Accelerators, University libraries, public libraries, chambers of commerce, and foreign embassies. The results will enable them to better understand the Generative AI technology (*In this study particularly ChatGPT*) adoption factors to make well-informed strategic decisions about its integration with business practices. This is likely to have an impact on strengthening the economy based on entrepreneurial activities.

Useful Instructions

- Please use the 5-point Likert scale; 1 representing strong disagreement and 5 representing strong agreement. The survey empirically evaluates the Generative AI adoption model that includes 12 latent variables—*Social factors, Domain experience, Technological familiarity, System quality, Training and support, Interaction convenience, Anthropomorphism, Perceived usefulness, Perceived ease of use, Perceived enjoyment, Emotions, and Switching Intentions*. A single Google Form section with several questions in it represents each latent variable.
- Each section begins with an explanation of each latent variable. Each section has a single text box if you would like to add qualitative details about each latent variable, apart from a few questions that need to be answered using Likert scale values of 1 to 5.
- The first section of the Google form collects your demographic information (*excluding any personal information*). This information will help the research team to analyze the diversity of the participants and their startups.
- Unless and until the participant explicitly provides their personal information for follow-ups, no personal information will be recorded on the survey form. Additionally, the Google form does not save the participants' email addresses. The personal information for future follow-up can be provided at the end of the Google form.
- The anticipated time to complete the survey is thirty minutes. You have seven days to complete it. This implies that you have the option to save your work and come back to the form whenever you'd like. You can choose to change your response after submission or finish the survey in chunks over a maximum of seven days. To do this, simply save the survey link that is generated after submitting the survey, either in its entirety or in parts, and access it by selecting "*Edit your response*" again.

Section 1 (Demographic Information)

Please provide your brief details which will help us to analyze differences in perspectives among the cohort.

- **In which Continent is your startup located?**
 - ☐ Asia
 - ☐ America
 - ☐ Africa
 - ☐ Australia
 - ☐ Europe
- **Industry served by your startup product/service?**
 - ☐ Engineering.
 - ☐ Medical.
 - ☐ Consulting.
 - ☐ Education.
 - ☐ Other.
- **How would you describe your gender?**
 - ☐ Male.
 - ☐ Female.
 - ☐ Other.
 - ☐ Prefer not to respond.

- **How young is your startup?**
 - ☐ 1 Year (or less).
 - ☐ More than 1 year but less than 3 Years.
 - ☐ More than 3 years or less than 5 Years.
 - ☐ More than 5 years.
- **How old are you?**
 - ☐ 18–25 Years
 - ☐ 26–35 Years
 - ☐ 36–45 Years
 - ☐ >45 Years
- **What is your highest education degree?**
 - ☐ Bachelor's degree
 - ☐ Master's Degree
 - ☐ Doctorate Degree
- **How many Years of experience do you have as an entrepreneur?**
 - ☐ Less than 3 years.
 - ☐ 3–5 Years
 - ☐ 5–10 Years
 - ☐ More than 10 Years

Section 2 (Social Influence or Social Factors)

Social Influence is defined as the “impact of an entrepreneur’s social environment, including observations of competitors, Family, and friends, on his actions and behaviours”.

- **Generative AI technologies reflect status symbol in my social networks (e.g., friends, family, and co-workers) (SF1).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- **People who influence my behavior would want me to utilize Generative AI technologies (SF2).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- **People in my social networks who utilize Generative AI technologies have more prestige than those who don't (SF3).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- **People whose opinions I value would prefer that I utilize Generative AI technologies (SF4).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5

- **People who are important to me would encourage me to utilize Generative AI technologies (SF5).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- **People in my social networks who would utilize Generative AI technologies have a high profile (SF6).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5

Any Comments or Useful Information that you wish to share?

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Section 3 (Domain experience)

Domain experience is defined as “the level of expertise an entrepreneur possesses in conducting business operations within the specific industry”.

- **My expertise in the specific industry contributes to a smoother adoption of Generative AI technologies for conducting business operations (DE1).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- **I feel confident that applying my industry-specific knowledge to effectively integrate Generative AI technologies into the business processes (DF2).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- **My domain experience facilitates a more seamless interaction with Generative AI technologies in business activities (DF3).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5

Any Comments or Useful Information that you wish to share?

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Section 4 (Technology experience)

Technology experience is defined as “the prior exposure and interactions an entrepreneur has had with the Generative technology for personal or professional purposes”.

- I had previously used the Generative AI technologies for various professional or personal activities (TE1).
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- I have actively used Generative AI technologies many times before (TE2).
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- Generative AI technologies have been used by me in undertaking my previous job assignments (TE3).
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5

Any Comments or Useful Information that you wish to share?

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Section 5 (System quality)

System quality is defined as the “comprehensive evaluation of a generative AI system, considering both functional and non-functional attributes”.

- Generative AI technologies provide rich functionality to undertake business tasks, for instance, gathering market research information (SQ1).
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- It is great not to be responsible for the maintainability of the Generative AI technologies (SQ2).
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5

- **I do not encounter problems with Generative AI technology accessibility (SQ3).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- **Information provided by Generative AI technologies is accurate (SQ4).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- **Information provided by Generative AI technologies is consistent with the answers already generated before (SQ5).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- **I think Generative AI technologies explain the answers it generates when requested by entrepreneur users (SQ6).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- **The information generated by the Generative AI technologies can easily be integrated with existing business systems (SQ7).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- **Generative AI technologies can easily be used any time; during busy hours or off-business hours (SQ8).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- **Generative AI technologies produce answers to the asked questions quickly (SQ9).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- **I can use the Generative AI technologies at any place (SQ10).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5

Any Comments or Useful Information that you wish to share?

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Section 6 (Training & Support)

Training & support is defined as the “availability of comprehensive resources to assist entrepreneurs in enhancing their Knowledge, Skills, and Abilities in facilitate a deeper understanding and proficient use of Generative AI technologies”.

-
- **I can accomplish my tasks using Generative AI technologies with prior training sessions (TS1).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
 - **I can use Generative AI technologies as the training opportunities exist in my organization as well as online (TS2).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
 - **I have good access to the training on Generative AI technologies (TS3).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5

Any Comments or Useful Information that you wish to share?

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Section 7 (Interaction Convenience)

Interaction Convenience is defined as the “user-friendly and seamless nature of the Generative AI technology interface, which makes it easier for the entrepreneurs to easily have interactions with the technology”.

-
- **The Generative AI technologies interface is very convenient for me to use as a knowledge collaborator in my business tasks (IC1).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5

- I find the Generative AI technology interface easy to navigate and interact with (IC2).
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- I like the seamless nature of having interactions with the Generative AI technology in terms of achieving your tasks efficiently (IC3).
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- The user-friendly design of the Generative AI technology interface enhances my overall experience when interacting with the technology (IC4).
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5

Any Comments or Useful Information that you wish to share?

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Section 8 (Anthropomorphism)

Anthropomorphism is defined as “the extent to which entrepreneurs attribute human-like characteristics to a generative AI system”.

- I find Generative AI technologies have human-like attributes, such as the ability to engage in natural conversations and generate responses like a human (A1).
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- I find Generative AI technologies easy to relate to as if they were a human conversational partner (A2).
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- I believe Generative AI technologies capture the nuances of human-like conversation, such as humor, linguistic nuance, and contextual understanding (A3).
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5

Any Comments or Useful Information that you wish to share?

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Section 9 (Perceived Usefulness)

Perceived Usefulness is defined as “the degree to which an entrepreneur believes that using the Generative AI technology for his business operations would enhance efficiency, productivity, and overall effectiveness, contributing meaningfully to the achievement of operational goals and addressing complex tasks in a manner that surpasses alternative methods or tools”.

- Using Generative AI technologies will help me to accomplish my business tasks more quickly (PU1).
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- Using Generative AI technologies will help me to improve my performance at work (PU2).
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- Using Generative AI technologies will help me to improve my productivity at Job (PU3).
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- Using Generative AI technologies will help me to improve my effectiveness on the Job (PU4).
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- Using Generative AI technologies will help me to make it easier to do my job (PU5).
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- I would find Generative AI technologies useful in my job (PU6).
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5

Any Comments or Useful Information that you wish to share?

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Section 10 (Perceived Ease of Use)

Perceived ease of use is defined as “the extent to which entrepreneurs believe that interacting with the technology is straightforward, uncomplicated, and requires minimal effort”.

- **Learning to operate Generative AI technologies is easy for me (PEU1).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- **I will find it easier to use Generative AI technologies to undertake different business operations (PEU2).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- **My interaction with Generative AI technologies will be clear and understandable (PEU3).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- **I would find Generative AI technologies flexible to interact with (PEU4).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- **It would be easier for me to become skillful in using Generative AI technologies (PEU5).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- **I would find Generative AI technologies easier to use (PEU6).**
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5

Any Comments or Useful Information that you wish to share?

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Section 11 (Perceived Enjoyment)

Perceived enjoyment is defined as “pleasure and satisfaction entrepreneurs derive from working with generative AI technology only rather than from the expected performance improvements in business activities or tangible benefits that may result from using the technology”.

- Using Generative AI technologies is pleasurable (PE1).
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- Using Generative AI technologies is interesting (PE2).
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- Using Generative AI technologies gives me enjoyment (PE3).
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5

Any Comments or Useful Information that you wish to share?

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Section 12 (Emotions)

Emotions are defined as a “mental state of readiness that cultivates behavioural actions of the entrepreneurs (happiness, anger, anxiety...) and helps them organize their behaviour (technology adoption or switch to human experts) in response to stimuli (external factors resulting in emotional responses)”.

- After interacting with Generative AI technologies, I feel Bored: relaxed (E1).
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
- After interacting with Generative AI technologies, I feel Malancholic: contented (E2).
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5

- After interacting with Generative AI technologies, I feel Despairing: hopeful (E3).
☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
- After interacting with Generative AI technologies, I feel Unsatisfied: satisfied (E4).
☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
- After interacting with Generative AI technologies, I feel Annoyed: pleased (E5).
☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
- After interacting with Generative AI technologies, I feel Unhappy: happy (E6).
☐ 1
☐ 2
☐ 3
☐ 4
☐ 5

Any Comments or Useful Information that you wish to share?

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Section 13 (Switching Intention)

Switching intention is defined as an “entrepreneur’s readiness to make a transition from using Generative AI technology to alternative solutions, for instance, seeking human expertise or exploring other options”.

- I may prefer to consider alternatives to Generative AI technologies as my primary knowledge collaborator for my business activities in future (SI1).
☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
- I think that I may switch to using human expertise for my business operations shortly (SI2).
☐ 1
☐ 2
☐ 3
☐ 4
☐ 5

- I sometimes agree to the notion of considering alternative technologies over Generative AI technologies (SI3).

- ☐ 1
☐ 2
☐ 3
☐ 4
☐ 5

Any Comments or Useful Information that you wish to share?

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Section 14 (Personal Information for future follow-ups, completely optional)

The research team plans to conduct follow-up interviews after the result analysis. The follow-ups may involve exploring reasons behind analyzed statistical correlations in the research framework or other inquiries, for instance, seeking their general opinion about future implications. The goal of these optional follow-up conversations is to gather rich perspectives about the analyzed results, especially unexpected outcome situations (if any). This will enable researchers to offer more in-depth explanations of the elements influencing technology adoption (just like case study explanations) that simply survey-based research would not be able to answer (quantitative-based).

Participation in the follow-ups is purely optional. If you are willing to participate in the follow-ups, just provide your personal information and we will then contact you with fresh Participation Information Sheets, and New informed consents. The GDPR notice will remain the same (as shared before conducting the survey). Agreeing to participate (by sending the informed consent), we will contact you to arrange interviews at your convenience and decide the medium of communication, for instance, phone, email, or online meetings. All submitted information will only be used in aggregate form; no personal information will be disclosed by the research team. Only with consent from the participants (captured in an informed consent form) will the specific quotes that they contributed to the questionnaire or in the follow-ups be made public (but anonymized, no personal information will be revealed). For more details about ethics, refer to the participant information sheet (for follow-ups).

- My name.
- My Startup details.
- My contact details (E-mail/Phone number. ...).

Appendix B. (University of Leicester's Standard Participant Information Sheet)³

Research Project title

Factors Influencing the Adoption of ChatGPT Technology by Startups: Perceptions and Attitudes of Entrepreneurs.

Invitation paragraph

You are being invited to take part in a research project. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully'.

What is the purpose of the research project?

The primary objective of this study is to ascertain the variables that impact the uptake of ChatGPT technology by startups, anticipate their influence on the triumph of compa-

nies, and offer pragmatic suggestions for various stakeholders, including entrepreneurs, and policymakers.

Why have I been invited to participate?

Based on your active integration of ChatGPT in your business operations, your experience will provide great value to the research. This research will then have a great implication for the business community. By using the research results, entrepreneurs may evaluate if ChatGPT technology is feasible for their ventures, determine effective adoption strategies, and possibly improve their creativity and competitiveness by optimal decision-making about the adoption of suitable AI technology.

Do I have to take part?

It is up to you to decide whether or not to take part in this research project. If you do decide to take part, you will be given this information sheet along with a privacy notice that will explain how your data will be collected and used and be asked to provide your consent to participate. If you decide to take part you are still free to withdraw at any time and without giving a reason, by contacting the researcher.

What will happen to me if I take part?

The startup entrepreneurs will be given a standardized questionnaire (which is built based on outcomes of stage one of the research study) to complete to gather data. The informed consent will be taken before distributing the questionnaire. The questionnaire will be created through Google Forms and distributed among the research study participants. To guarantee precision and effectiveness, the answers will be electronically recorded (Google spreadsheet). The questionnaire will also have the fields where participants could enter their organization details, their contact details (in case they are interested in follow-ups), background knowledge of AI technology, industry context, specific challenges, and success stories about their firms. After receiving consent, the researcher will give the participating startups structured questionnaires to complete to gather data.

What will happen to any samples that I provide?

Sampling: Purposive or convenience sampling, a non-probability sample technique, will be employed in the study, which will feature startups from the researcher's professional network in universities, public libraries, accelerators, incubators, and similar institutions. The researcher intends to focus on startups in their professional network that are either considering adopting ChatGPT technology or have prior experience with it. These startups will be picked because they can offer insightful information on the factors driving technology adoption and because they are in line with the goals of the research (they have experience with ChatGPT technology adoption). The qualified startups will receive an invitation to participate along with information on the goals and nature of the research project. Participants agreeing to participate will receive an informed consent statement detailing the study's objectives, methods, possible risks, and safety precautions. After receiving consent, the researcher will give the participating startups structured questionnaires to complete to gather data. If the founders of the startup have given their permission (and personal data), necessary follow-ups will be carried out.

Data Collection: The startup entrepreneurs will be given a standardized questionnaire (which is built based on outcomes of stage one of the research study) to complete to gather data. The informed consent will be taken before distributing the questionnaire. The questionnaire will be created through Google Forms and distributed among the research study participants. To guarantee precision and effectiveness, the answers will be electronically recorded (Google spreadsheet). The questionnaire will also have the fields where participants could enter their organization details, their contact details (in case interested in follow-ups), background knowledge of AI technology, industry context, specific challenges, and success stories about their firms.

Data Storage: An electronic database that is password-protected and safe will house all the gathered data. This database will only be accessible to members of the authorized

research team. The stored data will be deleted 6 months after the publication of the research results.

What are the possible disadvantages and risks of taking part? (where appropriate)

The study has no involved risks. 30 min time is estimated for filling the survey form. You have 7 days' time to fill it. This means that you can save your progress and return back to the form as when you want.

What are the possible benefits of taking part?

Outcomes: Business owners will get a better comprehension of the factors influencing ChatGPT adoption. They will have access to a framework for the adoption of technology, perceptions of possible obstacles, and factors to consider when making technology adoption decisions.

Implications: By using the research results, entrepreneurs may evaluate if ChatGPT technology is feasible for their ventures, determine effective adoption strategies, and possibly improve their creativity and competitiveness by optimal decision-making about the adoption of suitable AI technology.

What data will you collect about me?

We just need quantitative data from you (5-point Likert scale values). Providing personal data is optional and will be used for possible follow-ups in future.

Will what I say in this research project be kept confidential?

Data management will adhere to ethical and privacy standards. The research team leaders will be the only ones with access to the data, as it won't be available to other parties. Individual data gathered from the survey will not be shared in any follow-up correspondence with respondents. Additionally, the volunteer researchers will only be able to access the 5-point Likert scale values that have been registered for each question in the questionnaire (removing any personal or corporate-specific information) to guarantee that analytic methods are carried out appropriately. Only the aggregated values of the individual responses will be published.

How will you look after the data you collect about me?

We need to ensure that you understand what will happen to data we collect about you as well as your legal rights. This document is accompanied with a separate Privacy Notice providing further details. The copy is attached.

Your normal rights under the Data Protection Act and the General Data Protection Regulation apply. However, we need to manage your records in specific ways for the research project to be reliable. This means that we won't [always] be able to let you see or change the data we hold about you.

You can stop being part of the research project at any time, without giving a reason, but we will keep information about you that we already have and continue to use this for the purposes of the research project as outlined here. At all times this research study will comply with the UK General Data Protection Regulations (2018).

What will happen to the results of the research project?

The results will be published in leading Journals. The personal information won't be published except the cases where individuals explicitly make a request, for instance publication of the quotes.

What should I do if I want to take part?

You will be asked to complete an Informed Consent Form and to opt-in to a variety of research options by ticking the Yes or No box. This will confirm you understand how your data will be processed, protected, and reviewed for research purposes'.

Who is organising and funding the research project?

The research is joint research between Multidisciplinary Research Centre for Innovations in SMEs (MrciS), Gisma University of Applied Sciences, 14469 Potsdam, Germany and University of Leicester, UK. The research is funded by Winning Scientific Management, Portugal.

What if something goes wrong?

In the very unlikely event of you being harmed by taking part in this research project, there are no special compensation arrangements. If you are harmed due to someone's negligence, then you may have grounds for legal action, but you may have to pay for it.

Who has reviewed the research project?

The IRB approval is obtained from Winning Scientific Management, Portugal and University of Leicester, UK. Please contact Prof. Dr. Varun Gupta at vg109@leicester.ac.uk or Prof. Hongji Yang at hongji.yang@leicester.ac.uk, for any further information about research.

If you have any concerns or queries about the way in which the research project has been conducted, you should contact the Chair of the University Research Ethics Committee on ethics@le.ac.uk.

If you require more GDPR data protection information, then you can access this via the University's Information Assurance Services:

Information Assurance Services
University of Leicester
University Road
Leicester
LE1 7RH
T: +44 (0)116 229 7945
E: dpo@le.ac
W: <https://www2.le.ac.uk/offices/ias/>

Thanks a lot for spending time in reading this information.

Appendix C. (General Data Protection Regulation (GDPR) Privacy Notice)³

Privacy Notice for Research Participants

Research Study title & Researcher Name

Factors Influencing the Adoption of ChatGPT Technology by Startups: Perceptions and Attitudes of Entrepreneurs by Varun Gupta & Hongji Yang.

This Privacy Notice provides information about how the University of Leicester collects and uses your personal information when you take part in this research project.

Please also refer to the Participant Information Sheet given to you for further details about the research project, what information will be collected about you, and how it will be used.

The University of Leicester will usually be the *Data Controller* of any data that you supply for this research. This means that we are responsible for looking after your information and using it properly. This means that the University will make the decisions on how your data is used and for what reasons. The exception to this is joint research projects, if this is applicable you will be informed on the Participant Information Sheet as to the other partner institution(s) who will also have responsibilities for looking after your information. You can access more information on this via the University's Information Assurance Services:

Information Assurance Services

University of Leicester
University Road
Leicester
LE1 7RH

T: +44 (0)116 229 7945

E: ias@le.ac.uk

W: <https://www2.le.ac.uk/offices/ias>

Why do we need your data?

Sharing personal data is not mandatory. The personal data is only required for possible future follow-ups for instance, asking further questions after data collection.

University of Leicester's legal basis for collecting this data is:

Processing is necessary for the performance of a task in the public interest such as research.

What type of data will the University of Leicester use?

Only the quantitative data expressed as 5-point Likert scale values and personal data (if explicitly shared by the participants).

Who will the University of Leicester share your data with?

The data will not be shared with any institution. Only the aggregated results will be published in leading Journals and then shared with the audience.

Will the University of Leicester transfer my data outside of the UK?

No.

What rights do I have regarding my data held by the University of Leicester?

Your normal rights under the Data Protection Act and the General Data Protection Regulation apply. However, we need to manage your records in specific ways for the research project to be reliable. This means that we will not [always] be able to let you see or change the data we hold about you.

You can stop being part of the research project at any time, without giving a reason, but we will keep information about you that we already have and continue to use this for the purposes of the research project as outlined in the Participant Information Sheet.

Where did the University of Leicester source my data from?

Data will be collected from Entrepreneurs through survey forms.

Are there any consequences of not providing the requested data?

There are no consequences of not providing data for this research. It is purely voluntary.

Will there be any automated decision making using my data?

There will be no use of automated decision making in scope of UK Data Protection and Privacy legislation.

How long will the University of Leicester keep my data?

In line with the law, we will only keep your data for as long as we need to so that we can fulfil our research objectives.

We will keep your personal data (if shared) for maximum period of 6 months from when the study ends so as to successfully complete entire research (including follow-ups) and possible publication thereafter.

Who can I contact if I have concerns?

In the event of any questions about the research project, please contact the researchers in the first instance. Please contact Prof. Dr. Varun Gupta at vg109@leicester.ac.uk or Prof. Hongji Yang at hongji.yang@leicester.ac.uk

If you have any concerns about the way in which the research project has been conducted, please contact the **Chair of the University Research Ethics Committee** at ethics@leicester.ac.uk.

The University of Leicester Data Protection Officer is:
Data Protection Officer
University of Leicester,
University Road, Leicester, LE1 7RH
0116 229 7640
DPO@le.ac.uk

For further details about information security, please contact the **Information Assurance Services** team.

Appendix D. (University of Leicester's Standard Informed Consent Form)³

CONSENT FORM

Full title of Project: Factors Influencing the Adoption of ChatGPT Technology by Startups: Perceptions and Attitudes of Entrepreneurs.

Name, position and contact details of Researcher: Varun Gupta, Academic Visitor, vg109@leicester.ac.uk.

Name, position and contact details for Supervisor: Hongji Yang, Professor, hongji.yang@leicester.ac.uk

Please **initial** box

1. I confirm that I have read and understand the participant information sheet for the above study and have had the opportunity to ask questions.
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason.
3. I understand that at all times this research project will comply with the *General Data Protection Regulations (GDPR, 2018)* approved by the EU parliament on 14 April 2016 and passing into UK law effective from 25 May 2018 and that if I have any concerns how I contact the University of Leicester to raise these.
4. I agree to take part in the above research project.

☐
☐
☐
☐

Please **initial** box

Yes No

5. I agree to the use of anonymised quotes in publications.
6. I agree that anonymised information, gathered about me for this research project may be stored in a specialist data centre/repository relevant to this subject area for future research. **The database will only be accessible to the lead researchers.**
7. I agree to being named in subsequent publications and understand this will be for academic purposes and not commercial gain.
8. I agree that data collected for this research project may be used in future research.

☐
☐
☐
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☐
☐
☐
☐

9. I wish to receive a copy of the results of this research project, and I agree for my contact details to be retained and used for this purpose.

☐ ☐

Name of Participant	Date	Signature
Name of Researcher obtaining informed consent	Date	

Appendix E. (University of Leicester's Standard Participant Information Sheet (for Follow-ups)³

Research Project title.

Factors Influencing the Adoption of ChatGPT Technology by Startups: Perceptions and Attitudes of Entrepreneurs

Invitation paragraph

You are being invited to take part in a follow-up phase of the research project. We thank you for agreeing to take part in the follow-up (by recording your consent at the time of filling the survey form and sharing communication details). However, you still can decide whether or not to take part in the follow up, it is important for you to understand what will be involved in such follow-ups. Please take time to read the following information carefully'.

What is the purpose of the research project?

The primary objective of this study is to ascertain the variables that impact the uptake of ChatGPT technology by startups, anticipate their influence on the triumph of companies, and offer pragmatic suggestions for various stakeholders, including entrepreneurs, and policymakers.

Why have I been invited to participate?

Many thanks for your active contribution in filling out the survey form. Your contribution is valuable for the research project that aims to investigate the factors that impact the adoption of Generative AI technologies, for instance, ChatGPT technology by the entrepreneurs in their startups. We have now analysed the results and would like to share some interesting results with you to gather your opinions about the same. The goal of these optional follow-up conversations is to gather rich perspectives about the analysed results, especially unexpected outcome situations (if any). This will enable researchers to offer more in-depth explanations of the elements influencing technology adoption (just like case study explanations) that simply survey-based research would not be able to answer (quantitative based).

Do I have to take part?

It is up to you to decide whether or not to take part in this follow-up phase of the project. If you decide to take part, you will be asked for the communication channel convenient to you (*limited to telephone, emails, and online platforms for arranging online meeting*). If you decide to take part you are still free to withdraw at any time and without giving a reason, by contacting the researcher. The interview will be arranged in the best possible time convenient to you and the research team. The Privacy rules will remain the same as shared during pre-survey time period.

What will happen to me if I take part?

Interviews will be scheduled at the convenience of follow-up participants, who will only be contacted by phone, email, or online meetings if that is their chosen method of

communication. Researchers will have a deeper grasp of the multiple viewpoints about the research problem through multiple rounds of follow-ups. This will contribute to extending the research study's outcomes and enhancing its reliability and validity.

What will happen to any samples that I provide?

Your responses will be investigated to better understand the results from different perspectives. This information will be really valuable to provide explanation about the results and other interesting facts about the research problem which cannot be captured otherwise in statistical analysis.

What are the possible disadvantages and risks of taking part? (where appropriate)

The interview will last maximum 30 min. We don't anticipate any risks involved in the follow-ups.

What are the possible benefits of taking part?

Participation in the follow-ups will help research team understand better the research results and other themes that are not reflected by the results. This will help to provide not only empirical evaluation of the Generative AI adoption factors but also informative description and explanation of the phenomenon being investigated.

What data will you collect about me?

We just need qualitative data from you, that will be driven from your opinions and experiences. No personal data will be captured. Only the anonymized quotes will be published.

Will what I say in this research project be kept confidential?

Data management will adhere to ethical and privacy standards. The research team leaders will be the only ones with access to the data, as it won't be available to other parties. Individual data gathered from the survey will not be shared in any follow-up correspondence with respondents. Additionally, the volunteer researchers will only be able to access the 5-point Likert scale values that have been registered for each question in the questionnaire (removing any personal or corporate-specific information) to guarantee that analytic methods are carried out appropriately. The follow-up data will only be used to make the results more informative without making a reference to the source of the information. Only the aggregated values of the individual responses and the anonymised quotes will be published.

How will you look after the data you collect about me?

We need to ensure that you understand what will happen to data we collect about you as well as your legal rights. This document is accompanied with a separate Privacy Notice providing further details. The copy is attached. Your normal rights under the Data Protection Act and the General Data Protection Regulation apply. However, we need to manage your records in specific ways for the research project to be reliable. This means that we won't [always] be able to let you see or change the data we hold about you. You can stop being part of the research project at any time, without giving a reason, but we will keep information about you that we already have and continue to use this for the purposes of the research project as outlined here. *At all times this research study will comply with the UK General Data Protection Regulations (2018).*

What will happen to the results of the research project?

The results will be published in leading Journals. The personal information won't be published except the cases where individuals explicitly make a request, for instance publication of the quotes.

What should I do if I want to take part?

You will be asked to complete another Informed Consent Form and to opt-in to a variety of research options by ticking the Yes or No box. This will confirm you understand how your data will be processed, protected and reviewed for research purposes'.

Who is organising and funding the research project?

The research is joint research between Multidisciplinary Research Centre for Innovations in SMEs (MrciS), Gisma University of Applied Sciences, 14469 Potsdam, Germany and University of Leicester, UK. The research is funded by Winning Scientific Management, Portugal.

What if something goes wrong?

In the very unlikely event of you being harmed by taking part in this research project, there are no special compensation arrangements. If you are harmed due to someone's negligence, then you may have grounds for legal action but you may have to pay for it.

Who has reviewed the research project?

The IRB approval is obtained from Winning Scientific Management, Portugal and University of Leicester, UK.

Please contact Prof. Dr. Dr. Varun Gupta at vg109@leicester.ac.uk or Prof. Hongji Yang at hongji.yang@leicester.ac.uk, for any further information about research.

If you have any concerns or queries about the way in which the research project has been conducted, you should contact the Chair of the University Research Ethics Committee on ethics@le.ac.uk.

If you require more GDPR data protection information then you can access this via the University's Information Assurance Services:

Information Assurance Services

University of Leicester
University Road
Leicester
LE1 7RH
T: +44 (0)116 229 7945
E: dpo@le.ac
W: <https://www2.le.ac.uk/offices/ias>

Thanks a lot for spending time in reading this information.

Appendix F. (University of Leicester's Standard Informed Consent Form (for Follow-ups)³
CONSENT FORM (for follow-ups)

Full title of Project: Factors Influencing the Adoption of ChatGPT Technology by Startups: Perceptions and Attitudes of Entrepreneurs.

Name, position and contact details of Researcher: Varun Gupta, Academic Visitor, vg109@leicester.ac.uk.

Name, position and contact details for Supervisor: Hongji Yang, Professor, hongji.yang@leicester.ac.uk.

Please **initial** box

1. I confirm that I have read and understand the participant information sheet for the above study and have had the opportunity to ask questions.
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason.
3. I understand that at all times this research project will comply with the *General Data Protection Regulations (GDPR, 2018)* approved by the EU parliament on 14 April 2016 and passing into UK law effective from 25 May 2018 and that if I have any concerns how I contact the University of Leicester to raise these.
4. I agree to take part in the above research project.

☐☐☐☐Please **initial** box

Yes

No

10. I agree to the use of anonymised quotes in publications.
11. I agree that anonymised information, gathered about me for this research project may be stored in a specialist data centre/repository relevant to this subject area for future research. **The database will only be accessible to the lead researchers.**
12. I agree to being named in subsequent publications and understand this will be for academic purposes and not commercial gain.
13. I agree that data collected for this research project may be used in future research.
14. I wish to receive a copy of the results of this research project, and I agree for my contact details to be retained and used for this purpose.

☐☐☐☐☐☐☐☐☐☐

Name of Participant

Date

Signature

Name of Researcher obtaining informed consent

Date

Notes

¹ <https://www.europarl.europa.eu/news/en/press-room/20231206IPR15699/artificial-intelligence-act-deal-on-comprehensive-rules-for-trustworthy-ai>.

² Some questions are designed by author of this paper and some are taken/adapted from [12–14].

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