REGULATING GENERATIVE AI TECHNOLOGIES AND THEIR IMPACT ON FUTURISTIC RESEARCH AND INNOVATION

by

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Dedication

To my loving family, your constant encouragement and belief in me fueled my determination to see this thesis through

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Finishing this thesis has been a significant intellectual undertaking as well as a journey of philosophical and personal development.

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This dissertation is a reflection of my work as well as the combined efforts of all the people who have had a personal or academic influence on me. I have learned from the trip how important it is to ask questions and how different viewpoints can enhance our comprehension of difficult problems.

ABSTRACT

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This study investigates the regulatory landscape surrounding generative AI (GenAI) technologies and their implications for research and innovation in India. The objectives are to identify crucial regulatory aspects for GenAI, analyse privacy concerns and power dynamics impacting its adoption, evaluate the influence of existing government policies and legislation, assess the effectiveness of Indian regulatory bodies, and recommend a robust regulatory framework. The research addresses five key questions: the essential elements of GenAI regulations, the influence of privacy and power dynamics on GenAI implementation, the impact of current policies on regulatory effectiveness, the role of regulatory bodies in technology adoption, and the effect of regulations on futuristic research and innovation.

The study employs a comprehensive analysis of existing regulations and frameworks, privacy concerns, and the role of Indian regulatory bodies in shaping the technologies of GenAI. Overall, 480 relevant stakeholders were enrolled in the study. It examines the effectiveness of government policies and legislation in addressing the unique challenges posed by GenAI. The research finds that significant differences exist in the regulatory

aspects of GenAI, particularly concerning considerations, security standards, accountability, transparency, and explain ability. Additionally, the impact of current policies and legislation on regulatory effectiveness is substantial, highlighting areas for improvement. The study also reveals that Indian regulatory bodies play a critical role in shaping GenAI adoption, though there is room for enhancement in their strategies. The findings underscore the need for a well-defined regulatory framework to address privacy concerns and power dynamics, ensuring that GenAI technologies can be effectively regulated while fostering innovation. Recommendations include refining existing regulations and developing new guidelines to balance regulatory oversight with technological advancement. This study provides valuable insights into the regulatory challenges and opportunities associated with GenAI, contributing to the formulation of policies that support both technological progress and ethical considerations.

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Abbreviations	**Full Form**
GAN	Generative Adversarial Networks
BISE	Business and Information Systems Engineering
RNN	Recurrent Neural Networks
ML	Machine Learning
AI	Artificial Intelligence
SIS	Smart Information Systems
IoT	Internet of Things
DRL	Deep Reinforcement Learning
GDPR	General Data Protection Regulation
NLP	Natural Language Processing
GAI	Generative Artificial Intelligence
CCT	Complete Contract Theory
HCI	Human-Computer Interaction

CHAPTER I:

INTRODUCTION

1.1 Introduction

An AI which has decision making powers can be seen as a way in which users will be able to experience the metaverse in a personalized experience and further the credit goes to the P2P architecture of Web3, consumers handling online financial transactions have a greater degree of privacy and security than before (Mondal, Das and Vrana, (2023);Pal *et al.*, (2020); Jovanovic and Campbell, (2022)). In addition, the technology ensures confidentiality and integrity of data, which means that it cannot be changed or deleted, through its immutable data storage and transfer channels. These problems are addressed with content and digital asset generation, as well as filling in the important gaps in Web3 progress. Generative AI technologies such as ChatGPT may become productivity tools in the current Web 3. Generative AI technologies are capable of not only accelerating but also making the arrival of the Web3 era much more rapid as they ease the process and eliminate the inconvenience of productivity tools for Web3 producers and contributors.

Generative AI has arisen as a breakthrough AI technology that is capable of generating entirely new categories of materials such as text, digital pictures, and artificial data according to the information in (Sætra, 2023). Recently the development of technology is progressing extremely fast and its user-interfaces are becoming friendly and it is the easiest time ever to make high-definition graphics and films in text and digitally. At the beginning of the 1960s it was firstly introduced in the chatbots, however, this technology is not new (George Lawton, 2020). Despite that, old paths are being built anew with the technology creating more possibilities for both dubbing and strong instructional materials. AI-fueled deepfakes, used for psychologically manipulating people, and

cyberattacks resulting in installing fake leadership within companies which the employees believe to be their true CEOs are further problems.

The equipment used for GenAI entails (Digital) neural networks and advanced algorithms, like Generative Adversarial Networks (GAN). GenAI is an advanced artificial tool that can disrupt creative activities in a big way and be the much-needed next generation of AI that is essential for success. But, it poses serious issue of accountability, social impact, and transparency (Hirn et al., 2022). At this time, the implementation of AI technology systems with a distinct creation process that is similar to humans is the main challenge that the system face to ensure secure and safe evolution. The issue of a missing framework to enforce legal consequences on the offenders of crimes raised by GenAIs is the major practical obstacle for regulation authorities. So to limit the effects of these new tools, new rules are required (I. Glenn Cohen, Theodoros Evgeniou, 2023). Thus, to have the best value out of gena interactions which are globally based, international collaboration is a must in (Shabsigh, 2023).

It is amazing how much excitement there is at work around the new generative AI technologies likes of ChatGPT, as they are both very creative and flexible. Taking advantage of the application of ChatGPT which is based on deep learning models, therefore, materialized content can be produced in different configuration and for differing purposes, which is meant to contribute to improve in the efficiency and quality of content distribution. Among the many benefits that ChatGPT has, it can also facilitate the millstones, spur human imagination and intellect, and contribute to the inestimable creative innovations and new discoveries. Through this way, chat-GPT uses multiple sensory modalities and therefore, performs more detailed interpretations, analyses, and data generation (Gill and Kaur, 2023; Cantarelli *et al.,* 2018). This will be achieved through the creation of more specific and rich items of information by helping with the immediate

perception of it, and also the ability to adapt reaction to it, and finally feedback. The step of creating the rebuilt content will include technologies like virtual character, speech generation, and picture creation.

Technologies like the AIGC (for AI-Generated Content) were recently introduced in the Metaverse engine layer, and these have made the procedure of developing high-quality materials for the metaverse much more straightforward and easier. The cost of building the metaverse venue is still high, and it is available for most enterprises only. The amount of content is outsized and is not exactly what users expect. However, advanced it may be and the fact that a lot of money is put into making it a virtual place, does not however, guarantee it's exciting, open or refined. Artificial intelligence may be the answer to the unyielding issue of the affordability of metaverse environments due to its ability to assist creators in the clearing of the obstacles like providing scenes with basic explanations, thus the costs of the metaverse environment can be cut down drastically (Gaafar, 2021). VR/AR revolution will evidently be triggered by the introduction of the generative AI that in turn will let for even more networking media to get into the metaverse. The integration of the AI and the metaverse will be crucial as the AIGC era advances. This way, it will be imperative for current and emerging platforms that want to develop or are planning to develop metaverse spaces to find out if the metaverse can attain material richness through AI which will be attractive even in the absence of people.

The current status of AI governance can be understood in this work through identification of the existing frameworks, vulnerabilities and recommendations for resolutions. It pursues answers to questions as to how communities should utilize AI’s pros as well as its surrounding dangers in order to try and find the middle ground between innovation and ethics as well as government oversight.

Study intends to be one of the valuable ideas in the ongoing discussion of the likelihood of safe and beneficial expansion and implementation of GenAI through examination of the existing regulatory environment, ethics, and fast-moving AI technologies. This research is aimed at identifying the current scope of legal frameworks that would guide the positive use of GenAI to establish an ethical age in which we are currently living.

1.2 Background

Generative AI machine technologies have experienced a rapid development in recent times; this has resulted in the ability of machines to mimic human behaviour, to generate creative content and outputs, and even to act intelligently independently. This gradual mutation initiated the emergence of impressive transformations in the domains of art, literature, music, science and technology. On the one hand, technology has undeniably played a crucial role in many aspects of our lives; but on the other hand it has also given rise to questions regarding the ethics of such advancements, and the possibility for their abuse, while regulatory controls need to be implemented (Bandi, Adapa and Kuchi, 2023).

The new AI technologies known as generative AI are a revolutionary step for the field of machine learning when computers autonomously generate content that resembles the content produced by humans. The birth of these technologies is rooted in the pre-history of the early 2010s when scientists ventured outside the traditional neural network and began exploring new ways of using the brain cells for creative purposes. Among the most striking ones are natural language processing models, introduced by (S. Zhang *et al.*, 2023).

Generative AI or special algorithms that use training data to generate new and seemingly resembling content (pictures, audio, text, etc.) is a cutting-edge technology. Dall-E 2, GPT-4, and Copilot are some of the AI systems that before they become available to the general public, they are already changing our dealings with work

and communication. By being beyond just the creative applications like AI systems that resemble writers and illustrators, generative AI systems offer the intelligence and possibilities of being question-answering systems that humans can believe in and trust. In such a setting, the generative AI acts as a partner in customer service department while responding to basic questions such as medical advice and recipe creation and also the more sophisticated knowledge works. It is estimated that Generative AI can subtract over 300 million knowledge workers and increase the global GDP by 7% as predicted by the industry analysts (Goldman Sachs, 2023). Being the frontrunners in the Business and Information Systems Engineering (BISE), this is in a way going to have immense impact on the field, tracing both amazing opportunities and permanent threats and as the result will require a lot of effort to be put in, if the technology is to be guided in responsible way.

This part will give a brief picture of the history of this technology since its invention; it has achieved some notable milestones and breakthroughs. The article will outline the genesis of two types of deep learning approaches, such as "Generative Adversarial Networks (GAN)" (Creswell *et al.*, 2018) and "Recurrent Neural Networks (RNN)" (Lyu and Liu, 2021). which have fundamentally changed the cognitive abilities of AI systems to vividly display and express new thoughts and feelings.

Generative Adversarial Networks

Seeing GAN as the inflection point of AI and ML meant that a new era was inaugurated. A breakthrough in the field of AI occurred in 2014, when Goodfellow and his colleagues revealed the technology of generative adversarial networks, and since that moment a network known as GAN has created a stir in the AI domain (Goodfellow *et al.*, 2014). As a result, a GAN can be considered as a class of neural networks equipped with an ability to create novel and similar-looking elements that mimic a set of original data. While the conventional neural networks are mostly employed for the tasks like

classification & regression, these GANs generate synthesized data samples and thereby, a unique property of them. GANs adopt a groundbreaking architecture whereby the main networks are constituted by two neural networks: the generator and discriminator. These fight each other in a kind of cat and mouse game. The model's generator network creates samples that look like real data, while the discriminator network tries to identify fake examples during training. Stepwise, the generator improves to create completely realistic samples and the classifier has to develop higher accuracy to distinguish between the authentic and the forged data sets. The affliction of GAN is name hard line approach for this reason. Rivalry meanwhile between directors and critics goes on all the time, they fight each other all times, the director trying to be superior to the critic. This competitive activity results in learning that is surprisingly successful in revealing the hidden themes in the dataset distribution. GANs have proven to be highly flexible and valuable in such spheres like computer vision, natural language processing and generative art. They have already helped to understand reality with images, to reproduce human voice and music, and even to create whole paragraphs. On the other side, GANs can be a source of great hope but they are also accompanied by important problems and ethical issues (Creswell *et al.*, 2018).

GANs consists of two neural networks − generative and a discriminator − trained through a competitive learning process. The former tries to mimic the outputs, while the latter discriminates the amount of authenticity in the former. The rather simple mechanism of adversarial training has proved remarkably successful in generating the best piece of work in a variety of fields, such as image, audio, text and any other type of editing, sparking an outbreak of a keen interest and innovative products in the area of generative AI (S. Zhang *et al.*, 2023).

Besides, GANs, which offer clear benefits, also raise complicated ethical issues by presenting challenges. One of the challenges in AI system development is mode collapse,

training instability, and the possible risks of imparting bias or producing misleading outputs. These issues are addressed by the AI specialists who constantly meet and debate to improve their systems.

Recurrent Neural Networks

These Networks are good at learning features and long-term interaction from sequential as well as time series data. The RNNS consist of a set of nonlinear units among which at least one directed connection makes a circular path. Though the RNN is capable of mimicking any dynamical system, the learning of long-term dependencies is hampered in practice (Salehinejad *et al.*, 2017).

Recurrent Neural Networks (RNNs) represent a great invention in AI-machine learning field and thus they provide a variety of functions for operating with the data which has sequences. From the late 1980s a number of rigorous advancements were made in RNNs leading to substantial growth in applications and widespread use due to their ability to model temporarily irrespective of the sequence length (Schmidt, 2019).

Unlike feed forward neural networks (Kaviani and Sohn, 2021) which process inputs separately and do not have the ability to remember, RNNs have a state inside them which holds the information from past inputs. RNNs are efficient for "natural language processing, time series prediction, and speech recognition" due to their periodic structure, which allows them to show dynamic behaviour and capture trends in sequential data.

At the core of RNN stands a cyclic layer of recurrent connections with the help of which data can keep on existing from one time to another. Each node in this hidden layer is fed with data of both current input as well as its own previous state, which creates a loop of self-feedback, which in its turn ensures that the network keeps the form of a kind of memory. This repeated structure possessing the capability of processing sequences of any length as well as modelling time dynamic relations is what makes RNNs a perfect tool for

this task. The point of RNNs' benefitivity lies in their ability to serve data that are either sequential or of irregular and long length and structures. Unlike the customary neural networks which demand fixed-size inputs at all times, RNNs can accept variably sized sequences which is normal for problems such as text generation, machine translation, and sentiment analysis. Consequently, rather than denigrating RNNs, these should be regarded as advantages. One of the main problems associated with transition is an effect of vanishing gradients which causes gradients to diminish as they go back in time during training and difficult to learn distant range dependencies. To deal with this issue, versions of RNNs like LSTM networks and GRUs have been created that incorporate devices which helps in remembering long-term interaction and make gradient effects less problematic (Koutník *et al.*, 2014).

1.3 Understanding Generative AI Technologies

Definition and Characteristics

This mock-up of AI became a viral success, displaying such results on November 30, 2022: over a million of the chatGPT contributors joined it in a week. To make the most of the generative AI tool, which is – ChatGPT, it should carry out very complex tasks, regarding its sophisticated ability to do its work, taking into account the entire world. The amazing aptitude of ChatGPT to execute fundamental structures in the field of education gives both positive and negative ideas to educators because of the fact that this signifies an AI-driven change within the existing educational practice encounters. The study is exploratory and empirical in nature, and seeks to synthesize the recent literature to deliver some salient strengths and advantages as well as weaknesses and disadvantages of incorporating ChatGPT in teaching and learning. To enumerate benefits of ChatGPT, it is also efficient in terms of personalized and interactive learning process, creating stimuli that

can serve as jump off for formative assessment activities to provide continuous feedback that will inform the instructions and learning (Baidoo-Anu and Owusu Ansah, 2023).

Generative AI (AI for art) has seen rapid development recently, and many fields of it were transformed, e.g. “computer vision, natural language processing, and creative art”. The study aims to dredge the lacuna of generative AI by including all its elementary sections such as “requirements, models, generative types and evaluation metrics (Cao *et al.*, 2023)”.

In the field of generative AI, the aim is to design the algorithms and models, which can reproduce the information that is significantly equal to the actual data sets. The algorithms' capability of generating very real and wild data has unlimited implications for many spheres including healthcare, entertainment, finance, etc. Generative AI has introduced new angles for the creation of artificial images, text, and music, as well as human-like chatbots (C. Zhang *et al.*, 2023).

1.4 Applications in Research and Innovation

Generative AI technologies have rapidly become the main instruments embraced by research and discovering in several fields, sustaining innovation and opening new pathways to scientific projects. Their area of applications covers a wide space of domains, In this thesis, fresh and better answers to complex problems are taken into consideration and facilitating of knowledge in ways which never existed before.

Drug Discovery and Development:

Technology that utilizes AI in pharmaceutical research is significantly advancing the speed of discovery and development of new drugs. Researcher via use of generative models can also design and develop diverse molecular structures with optimal properties like potency, specificity, and bioavailability. These AI-generated molecules denote that the potential candidates for a drug now can be generated with alternatives like AI to reduce the

time and the resources required for the usual experimental approaches. Generative AI contributes to formulations of drug complexes, forecasting of “what-if” situations connected to medications connection, and targeting of newly discovered therapeutic protoids, and as a result, facilitates the development of improved and more reliable treatment options for the various diseases (Zhavoronkov, Vanhaelen and Oprea, 2020).

The procedures of drug discovery and development are intricate, lengthy and can rely on conditions of several variables. Machine learning (ML) solutions offer a machine-driven approach of handling structured, unstructured, or multidimensional data such that a lot of labour can be saved and automation can be implemented. ML implemented in all stages of drug discovery provides ample avenues for its application. Specific examples such as the biomarker identification, the target validation of drugs, and digital pathology data analysis in clinical trials are typical biological research cases. Such applications have been focused very closely on the context and methodology of intervention, with some of those interventions resulting in accurate predictions and revelations. The problem of using artificial intelligence arises because the blackbox character of Artificial Intelligence (AI) architecture increases uncertainty and non-repeatability of AI-generated results which would inevitably limit Artificial Intelligence (AI) application. In all regards it is imperative to uphold systematic and comprehensive multi-dimensional data in the computer. The involvement of ML into the drug discovering and the drug developing machinery accelerates and decreases the failure phenomenon to make the process data-driven and medical which might indicate the priority need to devote more efforts to handle the issues which are, on the other hand, related to securing the model validity as well as the need to increase the level of awareness of the factors needed to prove the exactness of the outputs of the ML model (Vamathevan *et al.*, 2019).

Materials Science and Engineering:

Generative AI is thus transforming materials science and engineering through the highly efficient exploration and exact material designs with specific characteristics. Researchers deploy generative models to traverse the colossal chemical space, predict material properties, and pick candidates that satisfy particular tasks like energy storage, catalytic reactions and electronic devices. AI-based material designs not only quickens up next-generation materials with greater functionalities, toughness, and environmentally friendly features but also makes the way for revolutionary advances in renewable energy, environmental remediation, and nanotechnology (Liu *et al.*, 2023).

'Artificial intelligence' (AI), on the verge of shaking up the whole idea of what's called the “fourth paradigm of science”, is a powerful weapon in the arsenal of the data-driven sciences, providing speedy discoveries. Due to the development of the hardware of ML algorithms, more and more outstanding achievements have been made by not only world famous researchers in the AI field, but also by those who work at the intersection of the fields. Along the line, ML and ANN applications for computational materials sciences are becoming really tremendous. In the frame of this article, advanced level supervised and unsupervised techniques will be covered together with their uses (Hong *et al.*, 2020).

Genomics and Personalized Medicine:

For the genomics as well as the healthcare areas, the AI generative technologies are engineering ground-breaking progresses in precision medicine and genomic research. AI algorithms process large quantities of genomic data interrogating the inherent genetic factors, data simulations of the biological processes, discovering molecular mechanisms of diseases, and identifying which medicine will be most effective under certain conditions for a particular individual. The use of Generative AI accelerates research in the field of genetic markers, leads to the categorization of diseases and the design of individualized

therapies that fit the patient's specific genetic characteristics. Through genomics data and their clinical info integration, generative AI enable health care professionals to leverage precision medicine strategies for better therapeutic effectiveness with fewer side effects (Khodadadian *et al.*, 2020).

Healthcare is undergoing a profound transformation, emphasizing the importance of leveraging cutting-edge technologies to drive the emergence of “precision medicine”. Recent scientific and technological advances have transformed illness comprehension, being diagnosed, and therapy, making treatment for patients more accurate, foreseeable, and individualised. Genetic, genomic, and epigenetic insights are increasingly recognized as contributors to various diseases. Through deep clinical phenotyping and advanced molecular profiling, causal network models are constructed, elucidating how genomic regions influence molecular levels. Phenotypic analysis plays a crucial role in deciphering the molecular and cellular pathophysiology of disease networks. Digital biomarkers (BMs) offer diverse applications beyond clinical trials, aiding in disease diagnosis and treatment guidance remotely and objectively. However, the proliferation of "omics" technologies and large datasets presents challenges in data analysis, requiring sophisticated computational and statistical methods. Despite the wealth of disease-related information, the key challenge lies in translating multi-parametric taxonomic classifications into enhanced clinical decision-making. Data analysis using AI and machine learning algorithms is possible with the big data revolution. Digital health improvements offer intriguing potential, but AI diagnostic tool reliability, clinical practice influence, and algorithm weaknesses remain concerns (Seyhan and Carini, 2019).

Environmental Science and Climate Modelling:

Generative AI contributes to environmental science and climate modelling by simulating complex environmental systems, predicting climate patterns, and assessing

environmental impacts. AI-powered generative models generate high-resolution climate simulations, simulate extreme weather events, and forecast long-term climate trends with greater accuracy and reliability. These AI-generated climate models enable policymakers, researchers, and stakeholders to make informed decisions, develop mitigation strategies, and address pressing environmental challenges, such as climate change, deforestation, and natural disasters (Kadow, Hall and Ulbrich, 2020).

The extensive acceptance of AI and ML in environmental sciences necessitates a discussion on their ethical and responsible use. Findings from other domains, where AI inadvertently perpetuated societal biases, highlight the importance of careful implementation. Despite the perception of objectivity due to data reliance on observations and mathematical algorithms, AI in environmental sciences can introduce similar unintended consequences (McGovern *et al.*, 2022).

Ethical and Societal Implications

During the early 2020s, "transformer-based deep neural networks" ushered in a new era of generative artificial intelligence (GenAI) systems capable of processing natural language prompts. This innovation led to the emergence of various large language model chatbots like ChatGPT and Bard, among others. GenAI finds application across diverse industries such as "art, writing, software development, product design, healthcare, finance and gaming" (Kirova *et al.*, 2023).

A study by Sharples, (2023) delves into educational interactions, reframing them not merely as prompt-response sequences, but as dynamic conversations and explorations between humans and artificial intelligences (AIs). In this context, learners engage in ongoing dialogue with AI language models and fellow human learners within an interactive digital ecosystem. Learning unfolds as this collaborative human-AI network sets objectives, interprets data, synthesizes understanding, resolves discrepancies, and applies

knowledge across domains. Developing social generative AI for education necessitates creating robust systems capable of conversing with both humans and other AIs, constructing knowledge representations, accessing online resources, and assuming roles ranging from trainer to learner. However, ethical considerations are paramount.

These automated systems must become aware of the boundaries of their achievements and start earning their responsibilities towards learners and the Internet integrity, while they should have to limit their intrusion into human educator's and experts fields. Hence, a well thought out structure along with regulation is needed that helps to forward socially constructive AI for educational objectives.

1.5 Impact on Futuristic Research and Innovation

AI development has turned into a change driver resulting on the appearance of LLM models such as GPT-4 and Bard, the latter of them being highly important for medical care. Nevertheless, they need to be applied adequately with their unique training approach and risk factors involved, including the release of GPT-4, which is planned to be launched in March 2023, with more text interpretation included within pictures. While controlling these developments is perhaps the most significant issue to consider, the future of medical technology is dependent on keeping the current safety level and ethical standards. Also, there is need to bear in mind the privacy of patients. Regulatory oversight must enable the beneficial use of LLMs in healthcare while mitigating potential harms (Meskó and Topol, 2023).

Large generative AI models (LGAIMs), such as ChatGPT, GPT-4, or Steady Dissemination, are quickly changing the way of communication, outline, and make. In any case, AI regulation within the EU and past has essentially centered on ordinary AI models, not LGAIMs (Hacker, Engel and Mauer, 2023).

Generative Artificial Intelligence (GenAI), particularly huge dialect models like ChatGPT, has quickly entered organizations without satisfactory administration, posturing both openings and dangers. In spite of broad talks about on GenAI's transformative nature and administrative measures, restricted inquire about addresses organizational administration, including specialized and commercial viewpoints (Schneider *et al.*, 2023).

With the potential to revolutionize a variety of industries, including science, entertainment, healthcare, and education, generative artificial intelligence (AI) generates new information in response to suggestions. However, these technologies also present important societal and policy challenges that policy makers will need to address. These challenges include the possibility of labour market shifts, uncertainty surrounding copyright, risk related to the maintenance of societal biases, and the potential for misuse in the production of misinformation and manipulated content. The propagation of false information and misinformation, the continuation of discrimination, the skewed public discourse and marketplaces, and the inciting of violence are all possible outcomes. Recognizing generative AI's disruptive potential, governments are aggressively tackling these issues (Lorenz, Perset and Berryhill, 2023). The various advancement of futuristic research and innovation through generative AI are as follows:

- **Advancements and Potential:**

Generative Ai technologies can lead to a series of future studies and development that are unprecedented in many areas. Utilizing the machine learning algorithms, these technologies set the stage for producing brand-new and creative outputs that are the prelude to ground-breaking findings and breakthroughs. In disciplines like medicine, generative AI can take part in drug discovery, modeling the protein structures and also making personalized treatment plans based on the sequence of factors. Also, in materials science, the generation of AI will greatly speed up the design of new materials mixed with desired

characteristics, thus leading to the creation of renewable energy, electronics, and nanotechnology innovations. On top of this, for art and design there is an enormous new area of potential to exploit in conjunction with generative AI, from experimenting with new aesthetics and generating elegant designs to pushing the limits of creative pursuit. Ultimately, this will be determined by factors such as the expansion of experimental boundaries, the demand for cost savings, and overall operational efficiency as well as different research fields (Nóbrega *et al.*, 2023).

- **Risks and Concerns:**

The vast potential of the generative AI technologies presents itself as a double-edged sword, if anything else. The hugely expected adoption of the technology also inevitably brings significant risks and worries to the extent of guiding the future research and development. An important concern lies in the fact that the bias and limitations of the training data set may be carried out into the outputs through the neural network, which might lead to undesired effects and reinforce the social inequalities. For example, as well as the ethical problems with AI generators in research especially the human genetics field when the privacy and consent issues are raised. In addition, because of the exploitation nature of this technology in the name of to create falseness or to do something harmful, the security both of cyber and of the society is endangered. Thus, in consideration of these risks the development of prevention mechanisms is vital to the ethical and secure use of generative AI in current and future researchers and innovators (Ali *et al.*, 2023).

- **Balancing Regulation with Innovation:**

Finding the appropriate balance of regulation over and with innovation is the basis for unpacking the rich potential of generative AI in futuristic research and innovation. Regulation can play a role in preventing and controlling hazards, but if regulation is too stringent it might be difficult to let the spirit of innovation through and

slow down innovation. Hence, comprehensive strategies of commercialization should be developed that would allow the technology to flourish but still preserve good governance, transparency, and ethics in AI usage. This can be achieved through the possible means of establishing an industry standard by including guidelines and corporate practices as well as fostering cooperation between the academic stakeholders, companies and the government entities. This setting is achieved as a result of aligning regulations and innovation; with this, benefits for generative AI can be enhanced while reducing the possible risks, thus creating a positive environment for future research and innovation to flourish (Nicholls, 2023).

- **Advancements and Potential:**

Generative AI technologies are at the core of the fundamental paradigm shift, where the futuristic research and invention in different fields can be contemplated. Through the use of very complicated machine learning algorithms, this technology empowers researchers working in unknown areas, as well as innovators who can explore new territories, and who can accelerate the pace of discovery by accessing new insights. AI agents in the medical field and healthcare can especially change the manner in which drugs are discovered and manufacturing is carried. This system of drug discovery would also be able to grasp huge datasets and predict molecular interactions and in so doing they will be able to identify promising drug candidates more quickly, what's more is that the genetically tailored therapy would be discovered for patients. Besides, generative AI possess ability in the field of medical imaging interpretation, diagnosis and prognosis prediction of diseases as well as improving doctoring operation and health outcome of the patients (Shah and Shukla, 2023).

Besides, it gives the scope for the materials science as well as engineering to vary or optimize through the innovative uses of generative artificial intelligence to produce

advanced materials with the desired properties. Through the process of like virtual atomic structures and predicting material performance, these technologies serve as the basis which are used for the development of lightweight, strong, and environmentally friendly materials to be used in the industries such as renewable energy, aerospace, and electronics. In addition, generative AI drives the creative process and innovation in art performances that make artists, designers and creative professionals free up their mind through the discovery of new artistic methods and the extension of the performance boundaries. Different mediums using such as art generation, music composition, virtual reality and interactive storytelling, are giving power to creators to realize some ideas that are hard to visualize before (Chen and Gu, 2020).

In sum, AI is generative has the impact of transformative research and innovation is similar deep and broad. Through offering the access to technology that previously only a few could afford, as well as releasing our creative potential, the AI technology allows us to have the opportunities to witness and achieve deep and consequential advancements in multiple disciplines. As a result of this, the AI technology becomes one of the key drivers of our progress and the main shaper of our future. Stepping into the shoes of researchers and innovators, we can say with a high degree of confidence that the scope of professional breakthroughs and inventions in the area of generative AI can only be limited by our visions, promising to bring a new era of scientific discoveries, technological innovations and creative minds.

- **Risks and Concern in cyber security:**

While the progress of the generative AI innovations can expand the horizons of research and development, their vast adoption will also raise profound concerns that stimulates a thorough consideration. Among the preeminent problems is the fact that natural language processing of training information designed for their creation may extend

some predisposition and obstacles within the generative AI models. These biases can accidentally creep into the produced models, that as a result can lead to unintentional consequences and the continuous of existing divides. By way of example, if primarily the data employed for generating a human-centered generative AI algorithm represents quite a specific ethnic group, the AI-based recommendations or treatments created will likely not be equally good or effective for other population groups and hence would lead to these people getting worse health care results as a result (Mandapuram *et al.*, 2018).

Talking about one problem is that AI-generated substances can be in the process of phishing fake. Having the ability to reflect human speech, AI can come up with very special messages that most of the time the customer is getting tricked into disclosing personal data or downloading malware applications. These situations always carry an imminent risk of people and networks being possible victims of misleading or manipulative systems that might be designed to distinguish actual goodness from AI-generated messages (Gupta *et al.*, 2023).

In addition to this, generative AI arouses a number of ethical problems such as the increase in the dissemination of fake news and disinformation. By means of AI technologies such as realistic-looking articles, social media posts or recordings which can be used for multiplying political falsehoods an unprecedented scale is possible. This not only undermines belief in data sources but also has the potential to cause social distress or control an open conclusion (Hiriyannaiah *et al.*, 2020).

Another critical risk is the potential for AI to computerize cyber-attacks. With its capacity to quickly analyse endless sums of information and adjust techniques in real-time, AI seems to upgrade the productivity and effectiveness of noxious exercises such as hacking, information breaches, or denial-of-service assaults. This poses an imposing

challenge to cyber security experts, who must ceaselessly enhance to remain ahead of AI-powered dangers (Yigit *et al.*, 2024) .

To summaries this Generative AI in cyber security brings dangers of fake news dispersal and cyber-attacks. AI's capacity to imitate human dialect might fuel phishing assaults with persuading messages, compromising delicate information. It too empowers the creation of misleading substances, spreading deception and prompting social distress. Additionally, AI computerization might escalate cyber dangers, increasing the effectiveness of hacking and information breaches. Concerns expand to protection infringement through AI-driven reconnaissance. Collaboration among cyber security specialists, policymakers, and technologists is vital while creating vigorous resistance. This includes actualizing measures like moved-forward verification and discovery frameworks, nearby moral rules for AI advancement, and sending to relieve these dangers.

Instruction in construction of buildings is a very volatile area of education that is under permanent change to adjust to the requirements of the ever-changing and a fast-developing area of business. Generating the replicas of conversational intelligence with the help of generative counterfeit insights technology like the ChatGPT conversational specialist is an innovative application in this field. With personalized feedback that is delivered both by ChatGPT and the interaction with the AI, students can learn in a way that suits their needs and obtain a better understanding of the subject from the realistic virtual simulations. Along with these advantages there would be a critical matrix of considerations as well. Generative AI models including ChatGPT are only as good as their training data and this poses risks like reflecting or spreading biases or even lie. Therefore, while AI in the classroom surface many ethical dilemmas, like, whether it is the right thing to depend on automatic generation of the work for the students or not, whether jobless will be the result due to lesser number of jobs. While ChatGPT attempts to make an important but not

a perfect part of the super human intelligence nowadays, it is also to say more about what is to happen. As innovation continues to play a role in the design of education, the teachers of engineering must listen to its call and find a way to adjust their existing system for instructional purposes so that the coming generation of engineers will be able to appreciate the potentials of generative AI while avoiding its negative consequences (Qadir, 2023).

As generative AI technologies become increasingly prevalent and influential, there arises a need for guidance on how to develop applications that promote both productivity and safety. Drawing from recent research in the fields of "Human-Computer Interaction (HCI)" and "Artificial Intelligence (AI)" (Weisz *et al.*, 2023) proposed a set of seven design principles tailored specifically for generative AI applications. These ideas acknowledge generative systems' inherent diversity.

Lately, it has become a cliché that the utilization of Information and Communication Technologies (ICTs) influences the way society functions on the socio-economic level. Thus, legal and ethical frameworks should be the new trend. Now, there are an ongoing interaction between two most significant happenings from ICTs standpoint. Future could be both for good which is having benefits and being harmful which is having negative implications on ethics and human rights. They, generally, relate with the fast data gathering and storage which is combined with the use of newer ways of analysis and application. AI and big data analytics are the chief characteristics of "smart information systems"(SIS) emerging day by day. SIS is an umbrella term that refers to a broad spectrum of intelligent sociotechnical systems developed with the fusion of AI and big data analytics to systematically increase efficiency and enhance how people interact with the systems. Facets of such systems are everwhere with the variety of them from Google's search engine, translation services, and amazon recommendations and Alexa Home Assistant. Furthermore, Facebook has, through the use of AI, advanced to targeted

advertising based on user likes. Besides, big data analytics is one of the areas that have been employed by preventive policing systems in crime prevention. Moreover, Healthcare evolution brings in surgical robots and personal fitness applications; that include at the same time, augmented reality techniques for various fields. SIS has a lot of advantages but along with this, the bigger issue of ethics and human rights still continue to exist. Problems like “data privacy, algorithmic bias” and the possibility of the technology being used for surveillance are the immediate threats that need to be addressed in order to carry on these technologies in a safe manner. Moreover, the candidate of tech monopolies and transforming the personal information into goods lead to the question of equality and fairness in the era of digitisation. The key to the SIS is to ensure that the technologist, policymakers, and the general public communicate actively and have a proactive mindset to safeguard the human rights and ethical aspects of AI and big data analytics. At the same time, they should make use of AI and big data analytics to innovate and transform the society. By having considerate regulations, transparency and accountability, one can withstand the benefits of the smart system while avoiding its social and ethics implications (Charbonnel, 2020).

Amidst intense global competition to harness the potential of Artificial Intelligence (AI), many nations are actively engaged in a 'race to AI'. However, heightened awareness of the technology's risks has amplified calls for regulators to prioritize trustworthy AI through comprehensive regulation. Such measures, while mitigating risks, could also foster AI adoption, enhance legal certainty, and bolster countries' competitive standing in the race (Smuha, 2021).

Undoubtedly, the emergence of generative AI (GenAI) models marks a significant milestone in the digital transformation of 2022. Models such as ChatGPT and Google Bard continuously enhance their complexity and capabilities, necessitating a deeper

understanding of their cybersecurity implications. Recent instances have underscored the dual role of GenAI tools in cybersecurity, both defensively and offensively, while also raising concerns regarding their social, ethical, and privacy implications.

Generative AI, exemplified by models like OpenAI's ChatGPT, encompasses algorithms capable of producing diverse content upon prompting. In this review, we highlight several illustrative instances of applications of GenAI are highlighted within the medical and healthcare sectors. In this thesis, pertinent issues, including trust, accuracy, clinical safety, privacy, copyright concerns are explored, and emerging opportunities, such as AI-driven conversational interfaces for enhancing interaction of human and computer (Zhang and Kamel Boulos, 2023) assert that as generative AI continues to advance and becomes increasingly tailored to the specific needs of healthcare, it will assume a more significant role in this field. Moreover, as regulations and policies governing its usage take form, its integration into medical practice is expected to grow, promising transformative impacts on healthcare delivery.

With the advent of ChatGPT, which uses deep learning algorithms to produce data with a natural tone, the universities and colleges are facing a different kind of higher education. While school authorities have concerns about academic dishonesty, plagiarism, and the effects of using this technology on critical thinking, these concerns stem from the current state of the technology. The aim of this paper is to delve into the opinion of ChatGPT about whether there is a probability that it might create a threat to universities. For this reason, it provides an account of a research that used an ethnography. One of the issues to be included in the research is evaluation of ChatGPT’s advantages and disadvantages and ways of dealing with the problems. What the results show is that an adequately specified conduct along with norms and frameworks is of crucial importance for responsible use of ChatGPT in educational institutions. Similarly, the study points out

learning empirical research as a necessary implementation for making complete understanding of user views and experiences possible. These results will therefore be incredibly significant in the search for the best strategies to assess what AI systems like ChatGPT may mean for higher learning institutions in the future. Finally, the research stresses the need for more studies as a method to choose effective methods and to gain insight into the future of using AI in education through thin ethnography, which is a new approach in the sector of AI (Michel-Villarreal *et al.*, 2023).

Speaking of the recent period, a large number of generative models of significant scale, like ChatGPT or Stable Diffusion have appeared. These models can do many amazing tasks, from taking over the QA jobs for people, to autonomously creating creative pictures, which in their turn start revolutionizing different industries. Hence, AI has certainly resulted in a wide impact on the industry and the society, and it might bring about a drastic shift in the job role requirements. For example , Generative AI can easily text into images or 3D images , as or videos, audio, or code or generate , algorithms, or scientific papers. This endeavour aims to provide a concise overview of the primary generative models and the sectors impacted by Generative AI, alongside offering a taxonomy of recent key generative models (Roberto Gozalo-Brizuela, 2023).

The ChatGPT took off in merely one week after the launch on 30-11-2022. Among millions of subscribers, it is topping the chart. The human capability to handle the tasks that require thin attention impressed the world with a very special AI tool. Rising from the facts that it seems to have many new approaches for teaching students, the adoption of this method to the classroom definitely stirred up many feelings among the teachers. For the purpose of this exploratory study, the focus is on the literature review that is guiding the research on the potential pros and cons of using ChatGPT in the classroom. Along with many other pros, I would mention the possibility that they provide for summative and

formative assessment as well as for the continuous feedback that helps to make the process of training more personal and interesting to a learner. However, on the other hand, we make clear the boundaries and implored in this thesis to watch out for the following: the possibility to introduce wrong information, the satisfaction of prejudices due to biases in data preparation, and privacy issues. It also extends the discussion of ChatGPT application in education by giving recommendations for teachers and learners. For positive outcomes in fostering student learning, legislators, academics, teachers, and tech community representatives should sit down at the table to start a constructive dialogue on how to properly use the developing generative AI technologies in the classroom in a safe environment (Baidoo-Anu and Owusu Ansah, 2023).

GenAI represents a branch of AI capable of independently creating diverse content forms like text, images, audio, and video. In the context of the metaverse, generative AI introduces novel avenues for content creation, addressing gaps in its development. Notably, products like ChatGPT hold promise in enriching search experiences, reshaping information dissemination, and serving as new entry points for online traffic. This transformative potential is poised to meaningfully influence conventional search engine products, driving industry innovation and evolution (Lv, 2023).

In clinical trials, individuals with the same ailment may exhibit varying responses to identical drug treatments administered under identical circumstances. While some may experience improvement, others may show no response or encounter side effects. This diversity in treatment outcomes among individuals with the same condition stems primarily from differences in molecular pathways, particularly genetic variations associated with the disease. Moreover, the development and dissemination of new drugs entail considerable time and expenses, making any errors in the process detrimental to both pharmaceutical companies and patients. That way, having confidence in the outcome of the precision

medicine dimensions, like genomics and transcriptomics, is important for getting more precise and reliable therapeutic solutions (Khodadadian *et al.*, 2020).

The Internet of Things (IoT) encompasses interconnected objects containing electronics, software, sensors, and actuators, facilitating data exchange and interaction. Through Artificial Intelligence (AI) techniques, governments can leverage the vast data generated by users, sensors, and networks to develop applications and gain insights.

The beneficial areas, which include the transportation, energy, health, education as well as the public safety operate within the context of the complementary strengths of the IoT and AI. The struggles of the public sector in embracing AI and the Internet of Things (IoT) are brought out in the guest editorial for a Smart Government quiz special edition The proposed action plan has to take into account a research methodology that will look at AI and IoT and see how they can be properly integrated. It is important to provide a synopsis of the six articles which this edition is composed of. Furthermore, the paper presents a research framework that converges future studies on smart governance and Artificial Intelligence (AI) and the Internet of Thing (IoT) with the help of the identified gaps in the current literature. Research can be more oriented at problem solving in specific fields, it is needed to study the actual practices and examine the evaluations after the adoption, it is time to apply more research methods and broaden theoretical basis. This holistic approach aims to advance understanding and application of IoT and AI in government settings, fostering innovation and efficiency (Kankanhalli, Charalabidis and Mellouli, 2019).

While many acknowledge the positive transformative potential of AI tools in government, there's also recognition that AI disrupts traditional decision-making processes and poses risks to democratic values. To address these concerns, a cautious approach to AI is advocated, prioritizing the establishment and maintenance of public trust. The Study analyse the changing dynamics of policy analysis and decision making in the AI landscape

using the extended Brunswick lens model and the problems this poses for deploying trustworthy AI solutions (Harrison and Luna-Reyes, 2022)

As the Internet becomes more widespread, sensor networks expand, big data grows, and the information community enlarges, the landscape surrounding artificial intelligence (AI) development undergoes significant transformation. This evolution results in AI entering a new phase, often referred to as AI 2.0, where it faces critical adjustments and necessitates new scientific breakthroughs to adapt to the changing information environment spanning physical space, cyberspace, and human society (Pan, 2016).

Artificial intelligence (AI) is poised to reshape various aspects of our lives, including how production systems are structured. Serving as a technological platform, AI holds the capability to automate tasks traditionally carried out by human labor or introduce new activities for human engagement. However, recent technological advancements have predominantly leaned towards automation, neglecting the creation of new tasks conducive to human employment. This imbalance has resulted in stagnant labor demand, declining labor income share, growing inequality, and diminished productivity growth. While the current trend emphasizes further automation in AI development, there's a risk of overlooking the potential of AI geared towards generating new tasks, which could lead to more favorable economic and social outcomes (Acemoglu and Restrepo, 2020).

While ChatGPT has recently ended up exceptionally well known, AI incorporates a long history and reasoning. Bozkurt *et al.* (2023) plans to look into how the GPT AI tech does strategically on part of what it can and cannot do and what the future of the field holds. The article gives a theoretical forecast about some of the themes which may be formed in the twenty-first century educational contexts and provides recommendations for the education sector of future. AIEd benefits as well as risks of AI are covered in the narrative, hence the need to have a voice on all aspects as the stories are told. Some believe

that the case of AI and human versus AI and human is the most suitable one to look for parallels and differences in this moment, simply because AI is now carrying out more and more educational missions that used to be served by humans. These two factors suggest that as a society everyone has to consider next attitudes toward instructions and roles of innovations and human teachers.

What does it mean for a generative AI demonstrates that it is logical? The rising teaching of logical AI (XAI) has made incredible strides in making a difference in how individuals perceive discriminative models. Less consideration has been paid to generative models that create artefacts, instead of choices. In the interim, GenAI advances are developing and being connected to application spaces such as computer program building. Utilizing scenario-based and question-driven XAI plan approaches, it investigates users' capacity needs for GenAI in three computer program building utilize cases: common dialect to code, code interpretation, and code auto completion (Sun *et al.*, 2022).

The phrase "generative artificial intelligence" (AI) describes a subfield of machine learning that includes the capacity to create modern content—such as texts, videos, images, and sounds—that mimics the output of humans. Given the related tools' ability to generate meaningful and coherent content in response to a user-defined prompt, a great deal of work has been focused on large dialect models within the context of generative AI. It acknowledges that it is crucial to highlight the promise of generative AI for advancing such information generation as editors of a journal devoted to advancing information generation within the domains of administration and organizations (Grimes *et al.*, 2023).

AI could completely transform marketing and helps others in creating visual content very fast, easy and inexpensively through realistic image producing digital tools. This study assessed the quality and likeness of images that were generated using OpenAI

image generator, which is a free and simple tool that is based on the GAN-based model that was trained by a large image and text description dataset. The survey conducted by Krishna Suryadevara, (2020) revealed that their image generator could create different high-quality, plausible pictures, which was evaluated as extremely realistic by the participants of the user survey The OpenAI do a wide range of tasks in an easy and user-friendly manner and having minimal user inputs. Nevertheless, the fact that there are restrictions of an opposite nature should be taken into account, since there are instances when images are shown as unbelievable or too much exaggerated features, and that there lack some visual nuances in certain pictures. Summing up, the OpenAI image generation is called one of the most reliable instruments of the visual content production, and a promise of qualitative innovations in the professional sphere of marketing and other domains is one of its features.

Today, media article, academic institutions and the population at large are discussing about generative AI in general. Machine learning is far from a just recent phenomenon – plenty of time had gone by without this term being familiar to most people until very recently. The biosphere is the most remarkable illustration of “generative” models among the nature phenomena and the only one that has been designed by a better model than itself - the human being. Such a scenario can inspire one to think and imagine how various other transitions to end episodes of the favourite TV show could happen. This article discusses how AI technologies based upon deep learning and artificial intelligence have the ability to affect the financial services. However, the generative AI's is a helpful tool for users, it still forces us to re-evaluate the previous ideas about ethics and society in the financial industry witnesses the power of the AI. It just needs ethic concerns to guide decision-making, to mitigate against the risks, and to ensure that the AI is generated and made use of in a way that the ethical principles, social values and community best interests

are kept at the core. The big breakthroughs in the field of deep learning combined with the vast amounts of market data have recently brought huge enhancements to this field. Future financial markets are not too far to consider numerous cutting-edge approaches that have not been considered yet, which may open up to their customers new opportunities, advanced research potentials, and more efficacious risk management instruments. To start with, as well as there are certain negative points that are associated with these abilities in the field of finance. Latest achievements in generative AI occur to embody improvements in algorithms and methods, which expands the opportunities to create authentic experiences of vision and sounds variety (Suman Kalia, 2023).

1.6 Societal implications of Generative AI advancements:

Artificial Intelligence is still having a great application and impact in crucial areas of communities such as health care, banking, and policing. Such artificially intelligent hardware continuously evolves together every next minute, which brings the promise to society to do the better, yet it could result in a huge risk. Artificial intelligence (AI) is being developed rapidly, AI governance must also put measures in place to circumvent this harm while maximizing this innovation in AI. This entails answering difficult empirical issues concerning AI's current and future hazards and advantages: evaluating effects of broader magnitude that dominate the nonlinear response, as well as making statements about the uncertain future. It went beyond the technological aspect and needed to think through the ideological question of ‘what is the useful society in which people can benefit from AI check too?’ It was equally difficult. Even though distinct groups might agree up on standards for the AI to satisfy (e.g., the privacy, fairness, and autonomy), yet they would still have a lot of responsibilities as their practical implementation would still be a major concern. It would be easy to declare that AI systems must preserve individual privacy, yet most individuals may be willing to give up some privacy, if it helps to discover a cure for

dangerous diseases. But any progress taken along this path has to face questions, which are multiple and sometimes even contradictory (Whittlestone and Clarke, 2022).

In the Artificial Intelligence (AI) research, Deep Reinforcement Learning (DRL) is serious study area that has been rendered as a subject of interest by many research community members lately and has potential applications in real world thus. DRL is one of the foremost ways of creating AI systems that can deal with and successfully perform operations in the complex situations within the real world that most closely replicate the problems that arise within the real world. This might significantly impact lives by the means of, for instance, automation augmentation in different spheres, the nature of cyber influence being more harmful or the consequence of new physical architecture safety (Whittlestone, Arulkumaran and Crosby, 2021).

Courts and AI are always depicted as two independent entities that should be combined with similar values and objectives. One the other side, there is also a huge part of AI technology that can be found in non-autonomous systems and used as cognitive tools by people. The extended mind thesis has made one cognitive feature of these tools a fundamental component of our thinking as our brains. However, AI takes up the concept of cognitive extension to move towards the new capabilities and thus sets up new philosophical, ethical and technical problems. In order to investigate these challenges better, (Swajan Rayhan, 2023) explain and allocate the AI extenders to a continum between separate-externalized systems which are loosely coupled with people, and those entirely mental processes when the execution is executed by the brain, making the tool irrelevant (Hernández-Orallo and Vold, 2019).

Youth can now create new and easily accessible media through the use of generative AI tools. They also bring up moral issues including data security, privacy, and ownership of art created by artificial intelligence, as well as the creation of fake media.

Young people already use products that use generative AI, so it is important that they understand how these tools operate and how to use or misuse them (Ali *et al.*, 2023).

Artificial Intelligence is transforming business operations and opening up new avenues for innovation, ranging from intelligent chatbots to self-driving cars. Still, worries about AI's potential effects on the labour market have been highlighted by its rise. There is a growing concern that the increasing use of AI will result in job displacement and unemployment (Chaudhary and Tyagi, 2019).

Generative AI is a ground-breaking technology whose deployment brings a lot of changes to many fields (entertainment, marketing, health care, financial, and research) and its contribution is expressed in creating the new and data content of the existing data and rendering the authoring and content creation simple and available to anyone. It has been exhibiting spectacular expansion that has been going on over several years. In 2023 decisive DAN AI impact reached 2,6-4,4 trillion USD (2,5-4.2%) of global GDP. Modern LLM models development aided by a few factors such as enhancements in the speed of computer processing power, data access and algorithms. The models can be used to generate text, picture and sound to provide AI services, as well as to use human languages and code for different applications. Most forerunners among AI companies are utilizing Gen AI to make strategic business decisions in their executive echelons. AI-related risks have been detected, there are no yet feasible measures to avert them yet. Leaders in the field anticipate filling the void with reskilled workforce and bring about changes in workforce. AI Gen generalized purpose text data process, analytics as well as customer services, giving the greatest influence of knowledge intensive sectors. Generating more revenue as opposed to cutting costs are the primary objectives of high performing AI firms that are rapidly expanding where and how Gen AI is a subject of business functions. Also, linking business growth and value to how firms organize themselves is an issue. There is

nothing like a reign of a leader when it comes to the imperiousness of a ruler. AI, even as a complement to human beings, broadens the job market and makes advances in major industry areas. There will be a trend towards more investments in AI as remained confirmed by experts. Singularity of AI development is the case subject for discussion, as somebody may think that machines may have the intelligence higher than people. Which side they take, some perceive singularity as likely to be a threat, others yet confident about human authority and the power of society that will probably take it. Predictions made by the most revered commons of Gen AI are that the decade which is coming can be the most successful ever if we are able to control the impact of its drawbacks and utilize the advantages of Gen AI (Vujović, 2024).

1.7 Research Problem

Research and innovation, as well as many other areas of activity can be seen as impacted by the Gen-AI technology which is so recent. On the other hand there are ethical and moral concerns, no accountability, and impact on future progress and research mainly due to the unchecked advancement of these technologies. This study aims at assessing the obstacles of regulation for generative AI systems and analyze how they could potentially impact the future of these systems.

1.8 Problem Statement:

Generative AI technologies offer unprecedented opportunities for research and innovation, enabling the creation of novel solutions and the exploration of new frontiers. However, various regulatory issues prevent its responsible use in futuristic research and innovation:

- **Unclear Legal Frameworks:** Being that the legal aspects governing generative AI inventions are still in their developing stage with most of the nations lacking specific rules governing these technologies, it is hard to give a clear picture. The

ambiguity attached to AI regulation creates great uncertainty for researchers and developers. Subsequently, the cultivation of new applications and solutions is drawn back due to the fact that the full potential of AI is not actualized.

- **Intellectual Property Issues:** AI-generated content that generates IP (intellectual property) and ownership concerns. A lack of accurate rules gives the innovators the courage to take part in AI-driven research and innovations, submitting to the possible legal issues that arise during the ownership and attribution of AI-produced creations.
- **Ethical Considerations:** It allows for the production of pretty and convincing data in a manner that creates ethical questions about the uniqueness of digital products and the creation of fake ones. Ethical codes ensuring that researchers face no dilemma when using AI-generated content in their work is the issue to be tackled by this consideration, which, in its turn, influences the quality of research and innovation.
- **Bias and Fairness:** Generative AI models could be given data prejudice that is from huge database as a basis. This bias at this stage may lead to biased research results and innovation, compromising the trustworthiness and reliability of the AI-driven systems for the solution. The Equitable Utilizing of AI in Research and Innovation Requires Actions Regarding Inequity and Bias-freedom
- **Impact on Innovation Ecosystem:** Innovation environment is greatly shaped by regulatory framework influencing both rewards and limitations for development teams, researchers and entrepreneurs. Too tight rules and regulations can dampen the creativity and cause problems with the development of AI applications, while not having any regulations at all may fail to protect people from AI drawbacks, thus traditionalers do not trust and do not believe in AI applications.

In conclusion, the regulatory dilemmas of generative AI technologies arise due to the fact that they challenge traditionally accepted ideas of creativity and future progress. Overcoming that happens here there is a need of developing coherent and comprehensive regulatory structures that ensure at the same time the balance between social interests and ethical issues with innovative development. This discussion considers to take part in the ever ongoing one of AI governances by looking at the regulatory framework that has a great influence on research and innovation in a dynamically developing technological world.

1.9 Purpose of Research

This study was designed to thoroughly evaluate the regulatory dilemmas that are forced by generative AI technologies and the further consequences of futuristic research and innovation. The continuous flow of AI developments, especially in the field of generative AI, calls for a deepened awareness of the possible effects of regulatory regimes related to AI applications and AI research. Comprehensive overview of the interactions between regulation, research, and innovation is in the focus to present decision-making process around AI-based technologies to the public. The study intends to provide a nuanced relevant picture that can be helpful in better design of the mentioned regulatory decisions. This research aims at, in particular, the consideration of the legal, ethical as well as intellectual property issues that come along with the use of the generative AI technologies in the job of innovator and scientist. Moreover, the study outlines the possible prejudicial and equitable factors of the AI-based systems and the roles of regulations in addressing these issues. This research also aims at scrutinizing regulatory conditions having an influence on the ecosystem of innovation which includes, working under incentives and hindrances of the people involved. Eventually, this researches' goal is to educate regulatory officials, researchers and industrial members in line to the need for the

development of responsible regulation that encourage innovation while at the same time safeguard ethical principles and the interest of society in the dynamic AI technology landscape.

1.10 Significance of the Study

This work will be important as it looks into the regulation frameworks that AI inventions in the future are likely to encounter and the effects they will have in the research and innovations of the future. With generative Artificial intelligence developing at a dazzling speed of machine, understanding and providing a solution for the regulatory challenges it is going to present seems inevitably to improve the process of responsible innovation. The present study will be conducting an in-depth analysis of the legal, moral, and intellectual property concerns that are inherently linked to generative AI in order to figure out how the existing frameworks can affect this technology.

Additionally, the research is focused on biases and fairness of AI-driven solutions, which reveals the level of regulations needed to truly level the field. Furthermore, the study provides insights into the effects of policy frameworks on the innovation ecosystem, including the incentives, and constraints encountered by the stakeholders. This information is useful to decision-makers as they make policy choices and balance between different actors in the world of scientific advancement and business. The importance lies in its ability to inform the formation of regulatory frameworks that function as a checks and balances system, taking into consideration the values of innovation, morality and society in the era of advancement of the machine learning technology.

1.11 Research Questions

The research questions that are considered in this chapter are as follows:

Firstly, in starting this research study, there is a need to examine the various critical aspect/elements and parameters of the regulation for generative AI. Hence, the first research question is:

- **RQ1:** What are the important aspects/elements and parameters of regulations for GenAI?

Secondly, the privacy concerns and power dynamics surrounding GenAI remain significant obstacles to its widespread adoption and implementation in India, highlighting the need for a deeper understanding of these issues to inform regulatory decisions.

- **RQ2:** How do privacy concerns related to GenAI and the power dynamics associated with the technology influence the implementation and usage of GenAI technology in India?

Additionally, the effect of the current system of government with its laws and policies on the effectiveness of the recommended regulatory framework for GenAI technology in India is not understood, and the biggest gaps have to be studied in order to come to a conclusion, which in turn can be implemented.

- **RQ3:** How do existing government policies and legislation in India influence the effectiveness of regulatory measures for GenAI technologies?

Furthermore, the practicality of Indian regulatory bodies in their path towards realising GenAI use by citizens is not quite convincing either, making a stakeholder survey to look into the existing strategies necessary to come up with the improvement of the current state of affairs.

- **RQ4:** How effective are Indian regulatory bodies in shaping the adoption and usage of GenAI technology, and what improvements can be made to enhance their influence?

Moreover, specific rules and regulations for AI technologies are still unclear besides the fact that it has a great influence on futuristic research and innovation in India. Therefore, a comprehensive examination of the current regulations and their impacts on AI is critical for all stakeholders and shows the need to analyse them in detail.

- **RQ5:** What are the prescribed Regulations for GenAI technologies and their impact on Futuristic Research and Innovation?

1.12 Thesis Outline

Chapter 1: Introduction

This chapter discusses the research issue and the need of regulating generative AI technology in futuristic research and innovation. It describes the thesis's goals, questions, and organisation.

Chapter 2: Literature Review

The literature review will explore existing research and scholarly works related to generative AI technologies, regulatory frameworks, and their impact on research and innovation. It will critically analyse key concepts, theories, and empirical studies to provide a comprehensive understanding of the research area.

Chapter 3: Research Methodology

This chapter describes the study's research design, data gathering, and analysis procedures. It will justify the chosen methodology and discuss any limitations or challenges encountered during the research process.

Chapter 4: Results and Discussion

The results and discussion chapter will present the outcomes of the study, organized according to the research questions. It will analyse the data collected and discuss the implications of the findings in relation to existing literature and theoretical frameworks.

This chapter will also explore any emerging themes or patterns and provide insights into the regulatory challenges and their impact on futuristic research and innovation.

Chapter 5: Conclusion and Recommendations

The final chapter will summarize the key findings of the study and draw conclusions based on the research objectives. It will advise governments, researchers, and industry stakeholders on how to regulate generative AI technologies and boost their effect on futuristic research and innovation. Additionally, this chapter will identify avenues for future research to further advance knowledge in this area.

CHAPTER II:

REVIEW OF LITERATURE

2.1 Theoretical Framework

The field of artificial intelligence (AI) is gaining growing interest among pioneers in information technology. Public institutions, such as libraries, are investigating, developing, and adopting technological advancements that facilitate the dissemination of information in tandem with the progression of AI. Considering the unprecedented nature of AI in this particular domain, it is possible to utilize Roger's Diffusion of Innovations model to examine the evolution of public attitudes toward innovation and their impact on the dissemination of novel technologies. Pending majority, late majority, "laggard," "innovator," "early adopter," "late majority," and "laggard" were the classifications of current librarians who responded to a survey by Lund *et al.* (2020), regarding their level of knowledge and comfort with artificial intelligence (AI) and its library applications. The survey results hold substantial scientific and practical implications for the utilization of the Diffusion model in library information technology, particularly with regard to enabling academic library personnel to readily embrace novel technologies.

Government agencies have the ability to cultivate a more collaborative and innovative environment through the utilization of AI applications. A user-friendly artificial intelligence system is highlighted, which integrates a practical array of functionalities across its diverse array of services. The objective of the study conducted by Almaiah *et al.* (2022) is to ascertain the manner in which AIA has been employed for governmental objectives in the Gulf region. In diffusion theory, the variables all have a favourable effect on both the export of technology and the business process simplification. The consequences of this investigation have substantial practical significance. Officials of the government are encouraged to prioritize factors according to their significance, and the author emphasizes

the need for a comprehensive comprehension of the interrelation among each of these components. The managerial implications illuminate the potential integration of AIA into public sector systems as a means to enhance service provision and inclusivity for the entire citizenry. A different study examined by Fredström *et al.* (2021) seeks to make a similar contribution to the body of knowledge regarding artificial intelligence (AI) and technology trend tracking by suggesting that "One artificial intelligence technique is "density-based spatial clustering of applications with noise" (DBSCAN) applicable to technology trend tracking. This study's findings imply that artificial intelligence could potentially be employed to monitor and delineate the progression of technological epicentres. Utilizing the map as a resource to collect data regarding prospective outcomes is possible. In addition, concerns such as information spillovers and institutional differences may provide further understanding of these processes. By providing a more precise instrument for elucidating the viability of an investment opportunity, the map aids professionals in making more informed decisions. Growth and decline in an industry are now easier to discern.

2.2 Theory of Reasoned Action

The social psychologists Ajzen and Fishbein established the foundation for the well recognised Theory of Reasoned Action (TRA), which aids in our comprehension and prediction of people's behaviour. The Theory of Reasoned Action (TRA) holds that a person's motivation for acting in a particular way that determines their behaviour. Subjective standards and attitude play a part in determining this aim (Hill, Fishbein and Ajzen, 1977). TRA has provided that the consumer motivation to perform a particular action is more influential to the performance of that action than any other factor. In turn, this intention is affected by two important factors: one’s perceived control over the behaviour or self-effort applied towards the behaviour and perceived appraisal of the behaviour by others. Self-perception of a behaviour can, therefore, be described as a

person’s evaluation of an activity as good or bad. The Perkins hypothesis refers to the perceptions of a given behaviour and a favourable attitude towards it will make people have the intention of carrying it out with pleasing consequences (Mariani, Perez-Vega and Wirtz, 2022). Conversely, if the behavior is perceived as unfavorable, the attitude will be negative, which may decrease the intention.

Perceived societal pressures to engage in or refrain from engaging in the activity constitute subjective norms (Ajzen, 1991). This includes the influence of significant others, such as family, friends, or colleagues, and societal expectations. When individuals perceive that important people in their lives support or expect the behavior, they are more likely to form an intention to perform it.

In the context of generative AI technologies, TRA can be applied to understand how attitudes toward AI and the perceived social pressures influence stakeholders' intentions and decisions regarding AI adoption and regulations. For instance, if regulatory bodies view AI positively and believe that the adoption of AI will lead to significant benefits, they are more likely to support favourable regulations. Conversely, if there is a perception of potential risks and negative outcomes, this might lead to more restrictive policies.

2.3 Human Society Theory

Human Society Theory explores the complex interactions between individuals, social structures, and cultural norms. This theory examines how human behavior and societal functions are influenced by social institutions, norms, values, and interactions. It gives a roadmap that can be used in the explanation of the manner in which social factors influence and are influenced by the behaviors of people and groups.

In the context of this research on generative AI technologies, Human Society Theory helps to analyze how societal values and cultural norms impact the development

and regulation of AI. The theory posits that societal structures, including legal systems, ethical norms, and economic conditions, play a critical role in shaping technological advancements and their integration into society.

For instance, societal attitudes towards privacy, data security, and ethical considerations significantly influence the development and regulation of generative AI technologies. As generative AI systems become more prevalent, societal concerns about their implications on privacy, job displacement, and ethical issues will shape regulatory frameworks and technological practices.

Human Society Theory also highlights the reciprocal relationship between technology and society. Technological advancements can transform social structures and cultural norms, while societal expectations and values can drive technological innovation and regulatory changes. Understanding this dynamic interplay is essential for comprehending how generative AI technologies are adopted and regulated in different societal contexts.

By applying Human Society Theory, this study aims to discover the broader social implications of generative AI technologies and the factors influencing their regulatory landscape. This approach provides a comprehensive understanding of how societal values and norms impact technological development and regulation.

2.4 Related Work

Theoretical foundation of generative AI

Research into generative AI has grown in importance alongside the development of AI technologies. As far as Lim *et al.* (2023), MicroAI also known as generative AI is a new emerging area of AI that can self-generate new contents from the given data inputs. Computer learning, vision, image processing, and NLP are generative artificial intelligence's theoretical foundations (Poggi *et al.*, 2022; Sleaman, Hameed and Jamil,

2023). From the viewpoint of Andriulli *et al.* (2022), Further, generative AI mainly utilizes machine learning. Machine learning is a field of research in artificial intelligence whose candidates are set to make computers learn new things on their own by analyzing existing data and creating methodological patterns that should be the most efficient. The generative AI can take benefit of it in order to learn new content from the big datasets of materials and to produce the differentiated content based on many sources. Generative and discriminative models are categories of models within the machine learning framework, which is one of the constituent technologies of artificial intelligence. While, generative models are capable of directly predicting a distribution and generating new data, discriminative models only obtain a conditional probability to solve the problem of classification and decision with provided data (Wu, Guan and Xu, 2020). Therefore, depending on the function performed, AI systems are classified as generative AI or discriminative AI. Discriminative AI especially emerged as a noteworthy work during the last decade in the AI era and its technology is relatively mature at this stage. Based on their findings, Samant *et al.* (2022) highlighted the importance of natural language processing (NLP) as generative AI's theoretical building block. In natural language processing (NLP), the emphasis is on human language and how generative AI can understand human language to generate varied content from varied language data.

Soni *et al.* (2020) A lot of smart products and services have been popping up in recent years, along with their commercial availability and socioeconomic influence. This makes this wonderful that is about AI is all hype or if it can genuinely change the world. Artificial intelligence (AI) has far-reaching consequences, and this article explores those consequences—both good and bad—for governments, communities, businesses, and people. From AI-related research and invention to its actual implementation, this article delves into the whole scope of AI's influence. Important AI-related academic

accomplishments and discoveries are discussed in the article, along with their effects on entrepreneurial endeavors and, by extension, the international market. The paper also helps to fill in certain gaps in our understanding of what is driving AI development. Two lists of the 100 most promising AI startups are taken into account in order to investigate AI-related entrepreneurial endeavors. The research's conclusions will shed light on the developments and effects of AI on companies and society at large. Additionally, it will help shed light on how AI has the potential to revolutionize corporate processes and, by extension, the world economy.

Dai, Liu and Lim (2023), with regard to the most elementary questions related to the purpose, application, and implications of ChatGPT and generative AI technologies within the new environment of today's society and higher education. It can be imagined that ChatGPT as a student-initiated invention that may greatly improve students' educational opportunities and experiences by bridging the gap between technological affordances and specific educational demands. On the other hand, there is a cost to this empowerment. There are new and rising difficulties in higher education evaluation, technology development and governance, and student training that all need stakeholders to work together to solve. It also suggests fresh avenues for educational theory and study.

Recently, the materials community is finally paying attention to Generative Artificial Intelligence (GAI) because of its impressive content creation abilities. Whenever the prompt paradigm and the reinforcement learning from human feedback (RLHF) are deployed, GAI starts shifting from tasks' specific patterns to general ones. This makes it capable of performing more intensive tasks like structure-activity connection solutions. As an example, Liu *et al.* (2023) from a technique aspect comprehensively discussed some generative models' advantage and disadvantage and currently GAI development status. In addition, the article delves into the practical uses of task-specific generative models in data

augmentation and materials inverse design. Using ChatGPT as a case study, it is investigated that possible uses of general GAI in producing content for various materials, solving differential equations, and answering frequently asked questions about materials. Additionally, six problems with GAI in materials science are outlined and their remedies are provided. In order to speed up materials R&D, this work lays the groundwork for offering effective and understandable methods for generating and analysing materials data.

According to another study, Lv (2023), Generative AI is a specific category of AI that has the potential to generate files that are new and distinctive (file media, photo, sound, etc.). without human intervention. Generative AI offers fresh ways to create content in the metaverse, bridging the gaps in its evolution. In the future, products like ChatGPT may open up new avenues for web traffic, revolutionise how information is generated and presented, and refine the search experience. The impact on traditional search engine products is anticipated to be substantial, spurring innovation and upgrading in the industry.

In this exploratory work, Mandapuram *et al.* (2018) investigated innovative methods in machine learning called Generative AI (GenAI). There is huge potential for fully generative AI to provide quicker, cheaper, and more accurate multi-scale materials simulations which could drastically reduce the costs of experimental iterations in product development. Scientists have devoted a great deal of time and effort to develop useful or socially and physically perceptive androids or clones of man. Perhaps, Generational AI could be beneficial for the present creative process as it erases this problem's dimensionality. Furthermore, the literature indicates that generative AI that is capable of producing textual, image, and even audible outputs as per command appear to improve daily. Secondly, there is a large number of IT companies operating actively and inventing and implementing their own systems that are in some way 'against' each other.

The widespread use of chatbots is indicative of the widespread interest in generative AI and its potential to revolutionise many industries. Being publicly available helped propel ChatGPT to popularity, even though competitors like Meta and Google already had chatbots. The public and financial institutions alike have taken an interest in ChatGPT, despite the fact that it is only a baby. Not only has it captured the public's attention, but ChatGPT has attracted users of all ages, backgrounds, and professions. There have been numerous experiments with ChatGPT. It has been the subject of numerous online news articles and social media posts. Aydın and Karaarslan (2023) Efforts to apply current contexts based on the analysis of prior studies and reveal users' expectations in relation to ChatGPT and Generative AI. It is discussed elementary functionalities and technical characteristics of both ChatGPT and its competitors: (Claude, Bard AI from Google, Wit. ai from Meta, and Hunyuan Aide from Tencent).

Generative AI and Innovation

The advent of GPT-4 and other comparable models from OpenAI's rivals, following ChatGPT's real-world kick-off, has caused generative AI to go global. The street has definitely discovered generative AI's place, and debating the technology's potential impact is now mostly moot (Sætra, 2023). The question that leftovers unanswered is the range to which it will have an impact and the risks associated with using AI to produce content, such as writing. It is constantly strived to enquire how new technologies mould, create, or maybe destroy the "good society," since technological progress necessarily involves societal transformation. This brief article aims to draw attention to some of the important problems that need answering about the micro, meso, and macro level effects of Generative AI, which is another example of autonomous technology that is politically and culturally disruptive.

Machines programmed with artificial intelligence (AI) are able to produce writing that is almost indecipherable from human handwriting. Is the level of trust in AI-generated news headlines comparable to that in human-generated headlines? (Longoni *et al.*, 2022). Some believe that news articles penned by AI might be more reliable than those authored by humans because AI is believed to be emotionally and motivationally detached. Alternatively, two pre-registered studies with 4,034 participants from throughout the United States found that readers were less impressed by the accuracy of AI-generated news headlines compared to human-written ones. People tended to mistakenly label as inaccurate news headlines penned by AI (rather than a person) even though they were factually accurate, and they tended to rightly label as inaccurate even if they were truly false. The growing reliance on AI for news generation, together with the related ethical and governance demands to reveal its usage and tackle accountability and transparency norms, makes our findings all the more significant.

In the past two years, numerous big generative models including Stable Diffusion and ChatGPT have been published. To be more specific, these models can operate as an all-purpose question-and-answer system or generate creative images autonomously, the latter of which is causing a stir in a number of industries (Roberto Gozalo-Brizuela, 2023). Consequently, these generative models may drastically alter a number of occupations, which has far-reaching social and economic consequences. Generative AI can, for instance, convert texts to images (as seen in the DALLE-2 model), photos to text (as seen in the Flamingo model), video (as seen in the Phenaki model), audio (as seen in the AudioLM model), other texts (as seen in ChatGPT), code (as seen in the Codex model), scientific texts (as seen in the Galactica model), and even algorithms (as seen in AlphaTensor) with ease.

Weisz *et al.* (2023), Increases in generative AI's capability, practicality, and usage are on the rise. Guidelines on how to build applications that utilise generative technologies in a way that promotes productive and safe use are needed as these technologies are being integrated into mainstream applications. Considering the above-mentioned literature on human-AI collaboration in the HCI and AI, the seven design principles for generative AI systems are presented. Such ideas lie on the foundation of generative variety of the given environment. There are six guiding principles for generative AI design that centre on three main ideas: exploration and control, mental models and explanations, and multiple outcomes and imperfection. Furthermore, it is strongly recommended that designers take into account the risks associated with generative models when creating products. These models can produce harmful outputs, be misused, or even displace humans. It is expected that the community would add these principles to their own work and make design decisions based on them when creating new human-AI apps.

The potential for generative AI technologies to enhance human productivity is exciting. Sida Peng, Eirini Kalliamvakou, Peter Cihon (2023), presented outcomes of a clinical trials using the artificial intelligence pair programmer GitHub Copilot. The hiring team's top priority was getting the JavaScript developers to build an HTTP server ASAP. By utilising the AI pair programmer, the treatment group was able to finish the assignment 55.8% quicker than the control group. The varied results that have been observed bode well for AI pair programmers as a means to ease individuals into software development professions.

Generative AI models excel in various NLP tasks, including reasoning, language production, and language understanding. Evaluating generative AI is obviously very difficult, but one of the most pressing concerns in the AI field right now is the breadth and depth of these models' capabilities. While generative LLMs have shown promise in

English-only studies, their generalisability to other languages remains an open question. Ochieng, Ganu and Sitaram (2023) recently released MEGA, the first all-inclusive testing of generative LLMs. It tests models using industry-standard NLP benchmarks across 33 languages and 8 different tasks. Ochieng, Ganu and Sitaram (2023) examined the effectiveness of generative LLMs in comparison to the prior generation of LLMs by testing them on various tasks and comparing their results to those of State of the Art (SOTA) non-autoregressive models.

Recent advances in AI's practical use have made it one of the most exciting new digital technologies, drawing the interest of academics and industry professionals alike (Hutchinson, 2021). Previous studies on innovation have primarily concentrated on the pros and cons of using digital technologies into the invention process. But since digital technologies' particular domains of applications vary, it is not enough to comprehend their broad impacts. Artificial intelligence (AI) stands apart from other digital technologies due to its dual nature as a tool for invention and a general-purpose technology. A number of companies are starting to include AI into their innovation strategies. The idea of self-innovating artificial intelligence (SAI) was introduced by them to explain this phenomenon. SAI is when an organisation uses AI to improve or create new products in small steps by drawing insights from data that is constantly mixed and analysed. This article provides an overview of the AI technology behind SAI, discusses how companies can use it to create more complex products, and suggests ways to continue researching this fascinating topic. SAI is going to revolutionized the innovation process.

The media and policymakers are paying close attention to new AI/big data pairings and the applications they enable. Privacy and other moral concerns have received a lot of focus. For this research, Stahl and Wright (2018) suggested To make sure the advantages of new technologies exceed their negatives, it is needed to fully comprehend these

problems and figure out how to fix them with the help of stakeholders, such as civil society. To ensure that the technologies are sustainable, socially acceptable, and desirable, they proposed that the framework of responsible research and innovation (RRI) be used. We explore possible implementations of RRI by drawing on our experience with the Human Brain Project, which could be a catalyst for the development of these technologies in the future.

In their work, Brynjolfsson, Li and Raymond (2023) analysed data from five thousand customer service workers to determine the best way to roll out a conversational assistance powered by generative AI in stages. Access to the tool boosts productivity by 14% on average, as measured by issues resolved each hour. It has a great impact on inexperienced and unskilled personnel, while experienced and highly competent people are little affected. They offered evidence that the AI model might help rookie workers gain expertise by sharing the possibly latent knowledge of more seasoned workers. Additionally, it can be demonstrated that AI support enhanced the customer sentiment analysis, decreases demands for managerial involvement, and boosts employee retention.

Another study by Eisfeldt, Schubert and Zhang (2023) provides a numerical response to this query related to the levels of exposure to Generative AI among employees of publicly traded companies in the United States. Data from earnings calls validates our innovative firm-level measure of worker exposure to Generative AI, which has intuitive correlations with firm and industry-level characteristics. After ChatGPT was released, they used Artificial Minus Human portfolios that consisted of long businesses with higher exposures and short firms with fewer exposures to demonstrate that, on a daily basis, firms with higher exposures earned 0.4% more than firms with lower exposures in excess returns. The vast diversity between and within industries is in line with the substantial disruptive

potential of Generative AI technologies, even if investors largely observed this release as good news for more exposed corporations.

The field of education stands to benefit greatly from the introduction of generative AI. Yet another investigation Cooper (2023) examines mostly three domains: (1) In what ways did ChatGPT respond to enquiries concerning the teaching of science? (2) How can teachers include ChatGPT into their science lessons? and (3) What is my take away from using ChatGPT as a research tool, and how has it been integrated into this study? This research delves into the technology using a self-study methodology. Surprisingly, ChatGPT's results were consistent with important study themes on a regular basis. But the way things are, ChatGPT could end up establishing itself as the last word in epistemic authority, making unfounded assumptions about a single fact and failing to provide adequate qualifications. Artificial intelligence (AI) raises important moral questions about its possible effects on the environment, difficulties in content monitoring, and copyright infringement. Educators should set a good example by using ChatGPT responsibly, placing a premium on critical thinking, and communicating expectations clearly. When making science units, rubrics, or quizzes, ChatGPT is a great tool to have on hand. Before using any AI-generated resource in the classroom, teachers should make sure it fits their needs. The research story may be made more understandable with the usage of ChatGPT, which also served as an editing tool. Therefore, the aim of this paper is to lay the foundation for the discussion of generative AI and its uses in the enhancement of science learning.

Recent paradigms in machine dealing have emerged in AI, steering from discriminative AI jobs as well as the data processing tasks to more complex, innovative generative AI jobs. Being the most powerful subclass of AI, generative AI relies on deep generative models and can produce natural and creative content (for example, texts, graphics or code) for numerous fields and domains with the help of simple inputs from the

user. This article Leonardo Banh (2023) discusses provided an extensive synopsis of generative AI, including its foundational ideas and future potential. They introduced key concepts, defined generative AI, and discussed its intrinsic qualities, as well as its promise and obstacles. For the former, the research and practice communities must gain a clear comprehension of the specifications of generative AI to optimize its assets and mitigate its flaws while simultaneously proactively enhancing the discipline's core understanding, according to the scholars.

Another study by Kankanhalli, Charalabidis and Mellouli (2019) Internet of Things can be described as the interconnection of objects stationed in the physical world to exchange information with others through the use of electronics, software, sensors, and actuators. Governments might erect apps and learn, using Artificial Intelligence (AI) paradigms from the sheer volumes of information coming from users, sensors, and networks. Therefore, IoT and AI have the capability to act as the catalysts for building the valuable services in various industries like logistics, healthcare, education, public safety and energy. This paper is a guest editorial for the special issue on integrated IoT and AI for Smart Government: The author explains that despite the challenges faced by incorporating and using IoT and AI, a definite scope of research in this area – with IoT-AI components for the smart government transformation is presented. In order, these are the titles of the six articles that form this special issue, for which short summaries are presented following this editorial. Finally, based on the proposed framework and the identified gaps in the literature as well as the papers under consideration for this special issue, research directions for AI and the IoT in smart government are presented. The four pillars of the agenda are as follows:The four areas can be as follows: (1) conducting domain-specific researches; (2) shifting from adoption studies to focus on these technologies' implementation and

evaluation; (3) identifying specific barriers and thus, corresponding peranton diverse ; and (4) enriching the existing methodological and theoretical frameworks for research.

Harrison *et al.* (2019) Innovations like Big Data, Internet of Things, and idea of Open Data have renewed organizational and technological interest in policy analytics in the government context. While this updated method of policy analysis retains all the tradition of statistically based analysis of policy impact and policy-making, it also diversifies that approach using such tools as computer simulations and artificial intelligence programmes. Data analytic capabilities have received a lot of focus, but the government's data management in the context of AI has received significantly less attention. While data analysis in general relies on good data management, this study argues that these skills are especially crucial in the current artificial intelligence setting. Reason being, getting data or systems won't cut it if they aren't managed correctly. The turnaround in trust on government data and ensuring the data are ready and fit to be used now and in future as called for in achieving the AI social good are a challenge we embrace.

Organisations' digital strategies are increasingly using artificial intelligence (AI). While private companies have been using AI for some time, public sector organisations remain far behind. There has been a dearth of information on the organisational deployment of AI in previous works that have investigated factors that promote AI adoption and usage. This is especially true in public sector organisations. Capitalising on this void, Mikalef *et al.* (2022) intend to explore which conditions facilitate the development of AI capabilities by government organisations. In this regard, the authors cross-checked with 29 European city tech directors what motivates their AI R&D efforts and employed an integrated and expanded TOE model. The cross-sectional study involved ninety-one municipalities in three European countries: Germany, Norway, and Finland; the models fitted to the municipalities' reactions were structural equation models. Thus, the theoretical model

consisting of five factors, namely perceived financial cost, organisational innovativeness, governmental pressure, incentives, and regulatory support was established to describe the association between the identified variables and AI's progress. Furthermore, it has been observed that the level of importance attributed to achieve technological solutions with artificial intelligence as well as the level of perceived pressure by citizens do not influence AI capacity. Probably, findings that we present in this paper may influence public sector managers to develop AI skills, and this could lead to a more cautious approach to AI.

Inefficiency has long marred China's public service delivery system. Prior efforts to tackle this difficulty in China using a toolbox e-government system model failed. As shown in research conducted by Zheng *et al.* (2018) wrote an elaborated case of improving the services concerning social insurance in Shandong Province, China. Designing the Smart Human-resource Services (SmartHS) platform and implementing the Complete Contract Theory (CCT), which addresses both the efficiency and qualities of services received and the waiting time and standardization of provided services with the help of an artificial intelligence (AI) engine, the platform optimizes system performance while expanding across organizational borders. SmartHS's successful trial implementation in three sites with 2,000 participating civil servants and handling nearly 3 million social insurance service cases demonstrated heightened user satisfaction and front desk workforce efficiency with only one-third of the staff required when the system was first conceived. This new form of operation indicating areas that can be assisted by AI has relevance to policy discussions in many areas of government service provision.

AI technologies such as machine learning, big data, cloud computing, and the IoT are advancing at a rapid pace, which has greatly increased the government's technological capabilities. Additionally, the use of AI in government has been rapidly expanding into more significant areas of government functions. As a result of the profound societal

changes that artificial intelligence (AI) is predicted to bring about—often likened to the Fourth Industrial Revolution—the public sector will have to adjust and coordinate the various social transformations that surround AI. Here, at this crucial crossroads, Ahn, Michael J. (2020) researched the potential and the possibilities of AI on those advanced technologies that has transformed our modern society and government; identify the features of AI and how it can be utilized by the government; analyze the current status of artificial intelligence (AI) in the government and discussed the main issues and challenges that AI will bring and how these can be solved.

With the incorporation of Generative AI (GenAI) in the classroom, there is a lot of possibility in enriching the educational experiences of students as well as the teachers. Although it will be possible to ensure that AI technology is used and applied efficiently and morally, then as a society to we must strive and make proper choices in order to achieve. Perera and Lankathilake (2023) gathered government, developers' and users', students' and educators', universities and schools', and academics' perspectives of GenAI to put together a list of recommendations to facilitate the efficient insertion of GenAI into the sector of higher learning. The purpose of this study is to provide recommendations to regulate GenAI based on the challenges, ethical issues, and ideal practices of implementing it by soliciting people's opinions on ChatGPT and the future of Google Gemini. Scientists think that lawmakers may create a transformational and ethical setting by taking a comprehensive view, allowing generative AI to reach its full potential while protecting students' safety and academic honesty.

Harrison and Luna-Reyes (2022) There is a rising agreement that AI's analytical and cognitive capabilities could revolutionize government, but it's also obvious that AI poses a threat to democratic principles and the old ways of making decisions regarding the government. In light of these factors, conservative approaches to AI should prioritise

building and maintaining public trust. Together, they demonstrate how policy analysis and the new wave of decision making differs from how they have been known and used, and how they are transforming in the current AI settings, based on the use of the enhanced Brunswik lens model. This paper also elaborated the challenges and the trustworthiness of AI. We put forward study avenues which support our recommendations on the course of action that the government should undertake to promote confidence in AI.

Janssen *et al.* (2022) Government decision-making is frequently augmented by computational artificial intelligence (AI) techniques. The problem is that decision-makers don't always have a good grasp of how algorithms work or why they reach certain conclusions. Using an experimental technique, we compared three scenarios where humans made decisions: (1) aided by business rules (BR)—the control group—, (2) without ML—the independent group—and (3) with ML as the support group. All participants had to do was to pick the right option out of a list of possible outcomes, and BR and ML algorithms could either confirm or refute their choice. That way, we could see if the participants grasped the constraints imposed by BR and ML. It is clear from the results of the experiment that algorithms aid decision makers in making better decisions. In light of these results, it seems that explainable AI, when coupled with experience, aids in the detection of algorithmically wrong proposals. The problem was that not even the most seasoned experts could spot every error. Achieving decision-understanding and -tracing capabilities alone will not guarantee error-free decision-making. Key components in enhancing accountability and transparency, according to the results, include training decision makers and carefully choosing algorithms to support judgements.

Yigitcanlar *et al.* (2021) Innovating digital technology has the potential to solve the challenges associated with urbanisation. The use of these technologies, however, brings with it the possibility that they will exacerbate existing urban issues or even cause new

ones to emerge. Responsible urban innovation principles must be adopted in a society with tremendous technological opportunities and great challenges associated with urbanisation. The desired urban results and futures will be delivered by adhering to these principles. In this paper, the authors offered a conceptual framework, an overview of the literature and experience on the topic of responsible urban innovation, and a concentration on AI systems used by local governments. In this viewpoint paper, we argue that responsible urban innovation requires a balance between the costs, benefits, risks, and impacts of creating, implementing, and managing AI systems for local governments. This viewpoint paper presents the findings of an expert team of researchers who have meticulously reviewed the relevant literature, studies, trends, and applications. In this study, they examined AI systems in local governments via the perspective of responsible urban innovation. By doing so, we gain fresh insights, build a conceptual framework, and identify potential research questions. Researchers can use the provided framework and overview, as well as the issues and research agenda, to guide future studies; this will aid urban managers, planners, and policymakers in comprehending the critical role of AI systems in local governments in assuring responsible outcomes.

The commercial and public sectors around the world are engaged in a never-ending arms race to create, deploy, and utilized Artificial Intelligence. It is unclear how AI will influence government duties and the preservation of public values. Toll *et al.* (2020) examines the portrayal of AI and the values associated with its application in Swedish policy documents using a well-established e-government value framework. Policy documents classify statements as either positive, negative, or neutral, and assign them to one of four value ideals. In the end, it is found that the AI discourse is too optimistic and that there is a misalignment between the many value ideals expressed in AI policy

discussions. In order to set reasonable expectations, a more complex understanding of AI in government is required.

Medaglia, Gil-Garcia and Pardo (2023) Currently, academicians and experts of different countries are gradually recognizing the opportunity of AI application in governmental context. This paper aims at describing the state of the art in applying artificial intelligence in the government and also presents an overview of major AI policies worldwide. That is in the Social Science Computer Review journal in a special issue on AI in Government. Our review of the literature on artificial intelligence in government led us to identify four key topics that warrant more study: It identified other concepts related to the topic, such as data governance, impact assessment approaches, trustworthy AI, and AI governance.

Erikson and Salzmann-Erikson (2016) It is quite probable that nursing robotics will incorporate artificial intelligence (Al) in a variety of forms, including medical and surgical robotic devices, physical reinforcements, droids and humanoids, and animal/pet robots. It is crucial to investigate and talk about the use of Al and robots in healthcare and nursing before they become ubiquitous. We suggest that monsters in popular culture could be examined in order to understand the dynamics that give rise to their monstrous abilities to empathise. This article's goal is to lay forth the theoretical groundwork and assumptions that support this concept. Creatures that lack a human form include both monsters and machines. Our findings shed light on potential future directions for nursing research in a postmodern, technologically advanced, and globally interconnected world. In this way, monsters open the door to investigating technological advances like Al. Understanding these compassionate norms and, more generally, human understanding, requires an examination of when and why monsters deviate from their normal behaviour. This analysis

can shed light on how care is conceptualised and nursing as a science. The connection between monsters, Al, robotics, and care is not as implausible as it may appear initially.

Hamet and Tremblay (2017) The broad concept of AI refers to programs that mimic human intelligence with little to no oversight from humans. Most people agree that robots were the first step towards artificial intelligence. The phrase "robota"—meaning biosynthetic machines employed as slave labour in Czech—is its origin. The contemporary boom in robotic-assisted surgery, which is named after Leonardo Da Vinci, is a lasting legacy of his work in this area, particularly in the realm of complicated gynaecologic and urologic operations. The foundation for this innovation was laid by Da Vinci's robot sketchbooks. In 1956, artificial intelligence (AI) was formally born, which is defined as the science and engineering of creating intelligent machines. The word encompasses a wide range of medical objects, from robotics and medical diagnosis to medical statistics and human biology—all the way up to the "omics" of today. The two primary subfields of artificial intelligence (AI) in healthcare that are covered in this overview are virtual and physical. The digital outpost incorporates methods from the field of informatics, including as electronic health records, deep learning for data management, and active physician supervision in therapeutic decision-making. The physical branch is exemplified by the robots that help the attending surgeon or the elderly patients. This subfield also includes targeted nanorobots, a novel approach to medication administration. Additional consideration of the social and ethical implications, evidence of their practicality in medicine and the economy, and the creation of multidisciplinary plans for their expansion are all necessary.

Hengstler, Enkel and Duelli (2016) Automatic automobiles and medical aid devices are only two examples of the many new uses for automation that incorporate AI. People are still sceptical about these applications, even if they are becoming more common. Using

the concept that is quite familiar and relevant in human lives that is trust, it is possible to build a distinct concept of the relation between people and technologies. Therefore, the objective of this article is to explore how firms signal to build confidence in AI. Trust in applied AI is always binaries as the analysis for nine researched applied cases of artificial intelligence in the transportation and medical technology industries can conclude. More specifically, it is emphasized that the mutually beneficial relationship between faith in the technology and faith in the innovative company and its messaging on the technology. By doing so, we demonstrate the importance of a democratic process for applied AI development and offer concrete ways to boost confidence in the technology.

Li *et al.* (2017) Providing a wide range of services with varying needs, 5G cellular networks are anticipated to play a pivotal role as both an enabler and an infrastructure supplier in the information and communication technology industry. A faster standardisation of 5G cellular networks is another indicator of increased adoption of the candidate technologies. That is why it's beneficial to shed light on the potential methods holistically and analyse the underlying design philosophy. This article aims to shed light on one of the most essential aspects of the 5G era's revolutionary techniques that were brought about by the introduction of initial intelligence in to practically almost every crucial aspect of cellular networks. Some of the problems that it comprises include radio resource management, mobility management, service provisioning management, and several others. Everything that is represented by AI is needed in today’s 5G cellular networks, but that is not sufficient as network setup problems and service needs become more complex. Therefore, authors explained AI's foundational ideas and talk about how they relate to the various candidate strategies for 5G cellular networks and showed that AI is adept at managing and orchestrating cellular network resources, and we emphasise the possibilities and difficulties of using AI to build intelligent 5G networks. With the use of

artificial intelligence, it was hoped that 5G cellular networks will finally be able to realise the much-touted ICT enabler.

Pan (2016), The information environment related to the previous AI development has been greatly changed by the sensor networks, the Internet, the big data, the information community expansion and the integration and combination of data and information in human society, physical world, and cyber world. Entering a new stage: AI 2. 0, That is why AI has to evolve in new situations, if the scientific basis of its functioning encounters new developments. The paper provides a concise overview of AI's 60-year history of development, examines the factors outside of AI 2.0 that encouraged its establishment and the shifts in its stated goals, and lays out the foundational concepts and early stages of the technology. Finally, recommendations for AI 2.0 advancement are provided in light of the interplay between social needs and the information environment pertinent to China's development.

Johnson *et al.* (2016) on Project Malmo is an open-source AI environment designed to help encourage basic AI research and is an exhibit of IBM. It is an extension of/ based upon the well-known computer game Minecraft. This led to an increase in AGI research within the field's progress, and with that increase comes the necessity for experimental tools that will aid in creating agents with the ability to learn how to solve all manners of problems in complex environments. Because of its infinitely customisable gameplay and detailed 3D environments, Minecraft is perfect for this kind of platform. From simple survival and navigation to complex teamwork and problem-solving, Project Malmo adds a high-level abstraction layer to Minecraft, allowing for a vast array of experimental scenarios. Authors showcased the features and possibilities of the Malmo platform in this demo. Supporting transparency and cooperation in AI research, the platform is made freely available as open source software at IJCAI.

Luxton (2014) examined the moral dilemmas that can arise from the use of AICPs in fields like mental health and other helping professions. The creation of AICPs, as well as the establishment of ethical standards and norms, are the subjects of particular counsel. The methods include a survey of essential ethical concepts in mental health treatment and an assessment of recent advances in the use of AICPs and related technologies. Then, the authors took a close look at the newly-emerging ethical concerns surrounding AICPs. Guidelines and standards for ethical conduct in AICP system development, including semi-autonomous and autonomous systems, are detailed. In order to assess the merits and demerits of AICPs, we will consider their advantages and their consequences for assisting professions. Conclusions: Neither the present nor the future usage of interactive AI agents to supplement nor even replace mental health care providers is taken into account by existing ethical standards or practice recommendations. Impacting the mental health care and other helping professions, AICPs bring up new ethical concerns. Topics such as competency, patient safety, confidentiality, competence, and liability are at the forefront. Medical professionals, nurses, social workers, educators, and ministers all face similar philosophical and ethical challenges when developing and implementing AICPs into their services. To ensure that AICP systems are used and developed in a moral and ethical manner in the future, it is important to give careful consideration to these things now. Everyone from policymakers and regulatory boards to end users, researchers, and AI developers can benefit from the discussion topics offered.

The impact of AI on our daily lives, both big and little, is growing. Design methodologies that integrate ethical concepts and handle societal issues are necessary to guarantee that systems will respect human values. This research found that Virginia Dignum (2017) investigated the consequences of AI as they are anticipated to influence the

European labour market and put forward the ART design guidelines for creating AI systems that are considerate of human values.

Goksel Canbek and Mutlu (2016) Intelligent personal assistants (IPAs) made it easy to get up-to-date, relevant information in today's tech-driven society. The common technological tasks can be performed at any time of the day or night using these assistants that are integrated in mobile operating systems. Intelligent personal assistants (IPAs) like Siri, Google Now, and Cortana from Microsoft can do things like take dictation, get directions with turns, vocalise emails, reminding of daily appointments, send reminders, answer factual queries, and trigger apps. Those AI-powered assistants do make it possible for humans and computers to communicate digitally using natural language. As such, this study's overarching goal is to investigate the feasibility of IPAs that learn via the application of cutting-edge cognitive computing technologies and Natural Language Processing (NLP). This is accomplished by providing a high-level overview of the IPA system's operation within the context of AI, which has lately improved its ability to understand, anticipate, and execute users' complicated, multi-step requests.

Regona *et al.* (2022) Nowadays, companies of various types and sizes begin to experience the presence of artificial intelligence (AI), an innovative and multifunctional tool. Nonetheless, it has been seen that the construction industry has not been as fast in integrating AI as many other industries. The factors responsible for the construction industry’s low-level implementation of AI have been discussed by limited review studies despite the fact that AI is a trending topic in built environment research. Thus, to fill this gap, this research will explore the challenges and opportunities of the construction industry in adopting AI. To achieve this objective, the research adheres to the PRISMA guidelines for systematic review of the literature. Furthermore, regarding the research of literature, the phases of the construction project’s lifetime, which are covered in the analysis, are

planning, design, and construction. The outcomes of the presented review show that (a) AI is beneficial in the early phases of a project, where precise estimations of events, risks, and costs are essential; (b) big data analytics to manage processes and reduce repetitive activities is one of the primary areas of AI application in construction; and (c) the decentralised structure of construction projects is the biggest challenge that prevents the successful incorporation of AI on a construction site, which results the enhancement of the market acceptance of AI practice is one of the objectives sought to be accomplished from the findings of the study that enlightens many of the stakeholders in the construction sector on the benefits and give or take of the adaptability of AI practice in the sector.

Vainio-Pekka *et al.* (2023)One new area of study that has developed in reaction to the problems that AI has caused is the ethics of AI. When it comes to putting AI ethics into action, transparency is major obstacle number one. Machine learning algorithms that can justify their choices could be a good answer to the problem of lack of transparency. By "explainable AI" (XAI), we mean AI systems that can be understood and interpreted by humans. Concerning artificial intelligence (AI) ethics and XAI, there is no shared theoretical foundation or methodology. No one seems to know how deep or versatile the field is. Better comprehension of the corpus requires a methodical strategy. A systematic review might help you find missing studies and areas of concentration. This article offers the findings of an SMS of the Ethics of AI research field. In this article, we will discuss the evidence-based practices regarding the theme identified for the functioning of XAI. An SMS allows you to search the literature in an ongoing, repeating manner or at least it did in 2004. As a result, this paper’s Systematic Map significantly advances the subject by presenting the who, what, when, and where of XAI empirical research in AI ethics. Mapping the explored area helps to define the further research gaps. We obtain empirical inputs in the course of the analysis part. As mentioned earlier, there is the rationale of the

theoretical and practical value that should be placed on the contributions. Since the developed SMS concerns wider ranges of AI ethics, the gathered data might create the foundation for further mapping.

Panayides *et al.* (2020) discusses translation into practice, suggests potential for enhancing the practice prospect in the future, and looks at the up-to-date best practice solutions in the field of the medical imaging informatics. particulaly it gives the readers a brief outline of the recent advancement in MIR collection methods of various technologies within the modality while focusing on the importance of efficient medical data management methods the field of artificial intelligence for large scale health care data processing and analytics. The article progresses to explain the current state-of-the-art in the algorithmic attempts toward the categorisation of illnesses and organs/tissues segmentation with a focus on the current artificial intelligence and deep learning dominating paradigms. New evidence suggests that improvements in in-silico modelling, in conjunction with developing 3D reconstruction and visualisation tools, have positive therapeutic effects. In conclusion, this study's focus on associate research areas and integrative analytics holds great promise for the future of imaging informatics in radiology and digital pathology, as well as for the entire healthcare system. The latter is expected to pave the way for precise medicine by facilitating timely prognoses, informed and accurate diagnoses, and successful treatment planning.

Chubb, Cowling and Reed (2022) Analyzing the AI history, it is necessary to state that a great deal of focus concerns the historical time and the scientific discovery which AI might provide. Notably, the unexplored role of AI as means for new methods, processes, management, and assessment has emerged as one of the most prominent research areas in the last couple of years among scholars as well as policy makers. To exemplify the issues that Colleges and universities are facing today, this empirical study utilizes Deductive

Thematic Analysis to go through the interviews with the totemic researchers about the potential impact of AI on research process and culture. From both a collective and an individual perspective, our respondents highlight both good and bad outcomes for researchers and related fields. It is believed that AI can aid in impact and interdisciplinary work, as well as with information collecting and other specific activities. Expanding AI in research should augment, not supplant, human ingenuity; nevertheless, utilising AI for the sake of "speeding up" or "keeping up" with bureaucratic and metricised processes runs the risk of perpetuating the bad elements of academic culture. To overcome these obstacles, research into AI's potential future role in research must go further into basic concerns regarding how AI could help provide new tools capable of challenging the ideologies and ideas that govern research institutions and methods. In this regard, we argue that meta-studies regarding the application of AI within academia are a precondition for the identification of strategies enabling the constant examination of the revolutionary AI implementation’s effects on both research and the innovative potential of scholars. Other considerations that must be made include preventive approaches which include ensuring that diversity and criticality at policy level, fields of study, and in the application of the framework amongst others.

Mlynar *et al.* (2022) Current processes that propel AI research are heavily panned for being too focused on technology and the business rather than rooted in societal problems. There have been calls for expanded involvement of social science specialists in Human-Computer Interaction (HCI) and Human-Centered AI (HCAI) discussions in order to shape adoption policies and the way AI should impact society. In contrast, we argue that the social sciences should play a more central role in shaping AI by presenting discursive stances on the kind of technology we want it to be. With an eye towards the field of urbanism, the objective has been to glean, via in-depth interviews with sixteen urban

specialists, their visions for the potential and desired effects of artificial intelligence on cities of the future. In this paper, reviewing the selected social sciences literature related to the topic, we explain how the concept of 'imaginary' has framed this study and how it could shed light on another form of non-human intelligent actors in the cities of the future. As they stated, explainable, robust, and general AI can be understood in terms of how data – powerfully structured by machine learning – can be linked with human knowledge expressed as prior beliefs, what has been called ''the logic of likelier likelihoods'' or implicit rationality. This integration can put AI from task-oriented (domain-specific) intelligence which works in the context of strict instructions to artificial general intelligence in general context which can learn from experience.

In this study, Zhuang *et al.* (2017) relatively new developments in the theory and practice of AI inside large data environments. Based on their findings, explainable, robust, and general AI can be achieved by combining data-driven machine learning with human knowledge, such as common priors or implicit intuitions. This integration can take AI from task-oriented (domain-specific) intelligence, which requires strict adherence to explicit instructions, to artificial general intelligence in a broader context, which requires the capacity to learn from experience. For this reason, AI 2.0, the upcoming generation of AI, is well-positioned to revolutionise computing, turn massive data into structured knowledge, and improve society's ability to make decisions.

In recent years, a sizable group of researchers has formed within artificial intelligence (AI) with the lofty objective of studying and developing software or hardware systems with general intellect on par with, or even higher than, that of humans. Goertzel (2014) surveys this varied group of people and how far it has come. Various definitions of Artificial General Intelligence (AGI) have been proposed, drawing from mathematical and technical frameworks as well as biologically based theories. System designs for artificial

general intelligence (AGI) range from symbolic to emergentist to hybrid to universalist. The article reviews general intelligence metrics and finds that while measuring human-level artificial general intelligence (AGI) might be easy (think: the Turing Test or a robot that can pass a high school or college entrance exam), measuring incremental improvement is more contentious and troublesome.

Howard (2019), The diverse range of disciplines that make up artificial intelligence (AI) includes computer science, statistics, cognitive psychology, decision theory, language science, neurology, cybernetics, and logic. A simple summer school at Dartmouth College held in the year 1956 marked the beginning of the modern era artificial intelligence. Machine learning is a subfield of artificial intelligence that has made many AI applications possible since its creation. These are search engines, e-shops, web and goods/services recommendation engines, voice and vision identification software's, sensors, robots, expert systems, and robotics. The forecast is that AI will continue the tradition of previous GPTs such as steam engines, railroads, electricity, electronics, the Internet, and bring deep changes to the world economy and society as its applications become integrated with everyday life. Future workplaces that use innovative AI applications will need to address serious concerns about worker health and safety. In this article, we will take a look back at where AI came from, how ML methods are being used, and what new AI applications are being developed for usage in things like smart DSSs, robotic devices, and sensor technologies. Moreover, we examine some of the possible outcomes for the employment in the age of AI, for instance, the interaction between people and machines and the fear of job replacement. Occupational research and practice will shift from the paradigm of response to a proactive one by expending strategic foresight in the AI workplace application. Indeed, to minimize the negative outcomes of AI on the health and safety of

the workers as well as the general welfare of the workers, one needs to understand the risks as well as opportunities of AI in shaping the future of work.

Brem, Giones and Werle (2023) The potential for artificial intelligence (AI) to revolutionise several industries is enormous. Within this framework, we go over the various ways AI is changing innovation. We present a theoretical framework that holds that AI is dual-purpose, serving as both an innovator and an enabler of new ideas. In addition, by looking back at the conventional innovation process and forward to the invention's beginning, we cover various implications and applications for theory and practice of innovation. To do this, we look at AI from several angles, including technological push, market pull, innovation funnel advancement, and new product creation. We wrap up by talking about where this area of study could go from here in the future.

According to a study by Hunt, Sarkar and Warhurst (2022) Artificial intelligence (AI) developments have sparked new discussions over how technology will affect the future of employment, with many worried about the possibility of large-scale layoffs. But there are methodological limitations to the evidence that is currently available. The vast bulk of research either(1) relies on subjectively estimated modelling projections or(2) uses proxies for AI effects to quantify the broader impact of automation technology. It is missing in analysis of what happens when businesses implement AI-enabled technologies. A third approach, based on customised surveys for employers, is suggested in this research note. The article provides only a descriptive information about correlating of adoption of AI and creation or elimination of jobs within establishments based on an upcoming and exclusive poll of the UK executives. This is then followed by the demonstration of how beneficial this technique is. The authors describe areas of research that may be advanced by this method.

According to a study, Frank *et al.* (2019) Artificial intelligence (AI) and automation are advancing at a rapid pace, which might greatly affect job markets. Though AI and automation can boost productivity for some, they can also eliminate jobs and alter nearly every industry to some extent. Worries of widespread technological unemployment and a resurgence of calls for legislative action to mitigate the effects of technology change are heightened by the fact that rising automation is occurring at a time of increasing economic inequality. In this paper, we'll go over some of the major roadblocks that researchers face when trying to predict how AI and automation will change the nature of employment in the future. There are a number of obstacles in the way of cognitive technology's widespread adoption. These include a dearth of reliable information regarding the nature of work (such as the ever-changing demands of various occupations), models that are based on empirical evidence that address important microlevel processes (such as skill substitution and human-machine complementarity), and a general lack of knowledge about the interplay between cognitive technology and larger economic and institutional structures (such as international trade policy and urban migration). Addressing these challenges will necessitate better data in terms of spatial resolution and longitudinal analysis, in addition to updating information on job skills. These enhancements will pave the way for interdisciplinary studies to objectively track and foretell the intricate changes in the nature of work that occur in tandem with technology development. Our last recommendation is to create a decision-making framework that prioritises general equilibrium behaviour and resilience to unforeseen events, because of the inherent uncertainty in predicting technological progress.

Organisational practices have evolved in response to game-changing innovations in areas like AI, blockchain, big data analytics, and the IoT. AI is the most recent technology game-changer and has the most revolutionary potential to alter the marketing landscape. People all across the globe are attempting to figure out which artificial

intelligence technologies will work best for their marketing tasks. A thorough literature review, on the other hand, can show how AI is important for marketing and where the field should go from here in terms of research. Research conducted by Verma *et al.* (2021) provided a thorough analysis of AI in marketing by reviewing all published works from 1982 to 2020 through bibliometric, conceptual, and intellectual network analysis. One thousand fifty-eight publications were reviewed in order to determine the performance of the scientific players, including the most relevant authors and sources. Analysis of co-citations and co-occurrences also provided the intellectual and conceptual framework. Subthemes in the research and potential avenues for further investigation into the use of AI in marketing were revealed through data clustering using the Louvain method.

Loureiro, Guerreiro and Tussyadiah (2021) provided offering a synopsis of current research on AI within a commercial setting and outlining a plan for future studies. The first part of this essay traces the development of AI research in business over the years by reviewing 404 pertinent papers culled from Scopus and the Web of Science. It then highlights important publications and the top venues for AI research. Latent Dirichlet Allocation, a text-mining technique, was then used to extract and thoroughly analyse latent topics from the literature. Results show 18 subjects grouped into four categories: AI's effect on society, AI's effect on organisations, AI systems, and AI methods. Following this, the research delves into a number of significant current developments and the problems they pose, covering topics such as AI integration, the Internet of Things (IoT), robotics and automated systems, ethics and legislation, and more. On the last page, we offer a research agenda to help drive future business AI studies towards solutions to the problems and trends we've already found.

Hagerty Alexa (2019) summarized the most important conclusions drawn from a survey of current research in the social sciences concerning the effects of AI and associated

technologies in five different parts of the world. For this social science project, our team combed through 800 scholarly journal articles and books written in more than 12 languages. According to the literature we surveyed, the societal effects of AI are anticipated to vary greatly among locales. Similarly, there is a good chance that local cultural and societal circumstances will significantly impact how people perceive and feel about AI. New studies conducted in the United States show that technology powered by artificial intelligence tend to widen existing gaps in society and make inequality worse, especially for vulnerable populations. We found this trend in the literature, and it stands to reason that low- and middle-income nations will feel the societal effects of AI the hardest, while high-income nations will reap the benefits with relative ease.

According to Bawack, Wamba and Carillo (2019) Analyzing AI at the personal, organisational, and social levels, it can be seen that the application of AI promotes the advancement of all IS aspects. Those who continue research and practical usage in the framework of information security are perceiving existence of artificial intelligence (AI) technologies and their potential to enhance IS as urgent issues. Many organizations and companies attempted to apply AI but did not succeed mainly because they had no clear understanding of AI since technology developed rapidly in the last decade. To better understand the variables of the acceptance, application, and impact on IS with the implementation of AI a dominant logic perspective should be used to examine the views of the leading developers of these related technologies.

The retail industry will be greatly affected by artificial intelligence (AI). Using data collected from previous studies as well as interviews with senior management, Guha *et al.* (2021) examined considered the adoption of AI by senior retailing managers, taking into account aspects including the amount of value generation, the degree to which an AI application is customer-facing, the availability of online usage, and the extent to which

ethical considerations are present. We also note that AI will be more effective if it aims to supplement (rather than replace) managers' decisions, and that the public perception of AI's short-term effects on retail may be exaggerated. As a conclusion, we stress that many non-customer-facing AI applications can yield significant benefits, even though most media coverage focusses on these apps' interactions with customers. Regarding the effect of AI on the retail industry as a whole, we are still really hopeful. Lastly, we present a research plan and discuss practical ramifications.

Li, Haohao and Ming (2020) examined analyses the literature to determine the effects of AI on accounting firms, accounting theories, and accounting staff abilities during the past few years. First, the results demonstrate that AI frees accounting staff from low-level repetitive tasks; second, financial accounting's initial goal has shifted to giving the company data to back up strategic decisions; and third, Secondly, accounting for management, the philosophy of value creation, and the management intelligence mechanism Future advancements in accounting theory are encouraged by the convergence of theory and AI. Thirdly, accountants' in-depth knowledge of financial matters, their complex multi-disciplinary backgrounds, and their relationships with both academic institutions and private companies.

Acemoglu and Restrepo (2020) The industrial process is only one area that artificial intelligence (AI) is poised to impact. Artificial intelligence (AI) is a platform for technology that may automate labour-intensive processes or generate whole new opportunities for human productivity. Technological progress in recent years has leaned heavily on automation, with little effort put into developing new jobs that make good use of human labour. Stagnant labour demand, falling labour share of national income, increasing inequality, and reduced productivity growth are all outcomes of this decision. The present trend in AI development is towards further automation, which could lead us to

overlook the potential of the "correct" sort of AI, which could lead to better social and economic consequences.

Khogali and Mekid (2023) The exponential development of AI and ML during the fourth industrial revolution has heightened public interest in these technologies' possible societal effects. This is why it's critical to weigh the benefits and risks of AI technology for human civilisation. Jobs and new markets have opened up in sectors including transportation, healthcare, education, and the environment thanks to advancements in artificial intelligence. Adding to this, virtually all of the specialists have noted that AI will continue improving over time. Thus, Automation and AI have been considered as change agents in many of the fields, and people are living through these technological evolutions as a part of humanity's progress in search of better and more affluent technologies. In this research, potential impact of AI and automation on the companies and employment are discussed in a nutshell. To predict some of the possible long-term consequences of AI on human civilisation, this research examines several interconnected main impacting potentials. Such areas can include things like job losses, the health of employees, dehumanizing work, people's AT fears, and samples of At advancements such as issues with self-driving cars. Thus, in collaboration with other transdisciplinary or multidisciplinary disciplines or fields, a dissimilar approach in narrative review and thematic pattern was done, particularly on the theorisation of AI technologies.

In this work, Zhang and Aslan (2021) details describe the current state of affairs in AI education research, introduce some AI education technologies and applications, discuss what positive impact these technologies have had, and can have, in the classroom, explain how AI is being used in education, and how those interested in AI education as well as engineers working on AI systems may find this information useful. There are also in-depth conversations about real-world consequences and potential avenues for future study,

including a wide range of viewpoints. In order to move AIEd forward, we need to take decisive action to resolve privacy and ethics issues with AI, and we need to work together across disciplines in massive, long-term studies.

Dwivedi *et al.* (2023) The field of artificial intelligence (AI) encompasses a wide range of innovative tools that are having far-reaching effects on many facets of human life, including economy, culture, and the natural world. Opportunities presented by artificial intelligence (AI) are growing in importance for both societal and corporate organisations as digital computing devices proliferate and big data becomes more prevalent. AI is of popular interest to both academicians and practitioners; resulting in almost all researched areas being covered in the majority of the publications. This paper seeks to lay a foundation for subsequent studies in the area of artificial intelligence by exploring the history of AI's growth and published works in Technological Forecasting and Social Change (TF&SC). To unravel, archive, and exhibit these undercurrents in the AI research literature, this work employs structural topic modelling (STM), which is a machine learning-based technique. With the second objective of ascertaining AI's disciplinary impact, the analysis considers the disciplinary perspective in the intellectual structure of AI research. Regarding the eight main subjects out of which arose from the topic modelling, namely, healthcare, circular economy, and sustainable supply chain, AI adoption by consumers and how AI is used for decision purposes have been moving up in the recent past. Accounting, business, management, computer science, social science, and engineering are just a few of the fields that have been profoundly impacted by AI research.

As per a study by Brougham and Haar (2018) Thus, futurists believe that nineteen percent of the modern occupations could be substituted by STARA—Smart Technology, Artificial Intelligence, Robotics, and Algorithms—by 2025. Nevertheless, there is a lack of data regarding how workers anticipate and adapt to these technological developments as

they pertain to their own employment and professional paths. In this study, we developed a new metric called STARA awareness to gauge how much workers worry that these technologies could one day do their jobs for them. Because of the correlation between age and technological expertise and professional advancement, we also examined age as a potential moderator of STARA. We examined the effects of STARA knowledge on several occupational and health-related outcomes using a mixed-methods strategy with 120 workers. Organisational commitment and job satisfaction were inversely connected to STARA awareness, while turnover intentions, cynicism, and despair were favourably related.

According to Castillo and Taherdoost (2023) Customers' habits have shifted drastically since the COVID-19 pandemic hit, mostly because they've become dependent on online buying. A number of businesses had to come up with creative solutions to stay competitive and adjust to the quick changes brought about by the global epidemic, which forced people to stay home. On the other hand, emerging technologies like AI have been accelerated by the pandemic. AI is the study and development of computer programs and hardware with the goal of giving these objects the aptitude to learn and manipulate data in order to solve problems or make decisions independently. Software with artificial intelligence capabilities can be tailored to meet the specific requirements and performance objectives of any given organisation. While artificial intelligence (AI) provides e-businesses with numerous benefits, particularly in standing out from the competition, it is still a rapidly evolving technology. Organisations will not be able to take advantage of this technology to its maximum potential due to a lack of knowledge about how to use it. There have been several debates on the ethics and privacy of AI, which has prompted studies aimed at improving the systems' legitimacy and trustworthiness.

Özdemir and Hekim (2018) the innovative idea of symmetrical innovation as the foundation for Industry 5.0, which has the potential to democratise the coproduction of knowledge derived from Big Data. Although it makes use of the Internet of Things (IoT), Industry 5.0's innovation ecosystem design is three-dimensionally symmetrical, setting it apart from earlier automation systems. This includes: (1) a built-in backup plan in the event that highly-connected, deeply-rooted digital knowledge networks go down. These safe spaces are orthogonal in three important ways: First, the pathways are different from automated networks (e. g. , e-patient records vs. material/article trails of vital health data), (2) both acceleration and slowing down are valued equally when returns are lower (e. g. , after innovation 'plateaus'), while (3) offering the basis for PETER, post-ELSI [Electronic, Life, Science and Innovation] technology evaluation research, as the new social science As for the methodological concerns, PETER evidently acknowledges and takes into account the relevance of technological opportunity costs, ethics, framings (epistemology), independence and reflexivity of the SSH research in the technology policymaking context. The upcoming Industry 5. 0 is designed to create innovation ecosystems that are mirror images of each other and fully utilize 3D symmetry in order to create systems that are fully automated and based on Big Data, all the while maintaining safety, implementing advanced technology policies, and engaging in implementation science that is done responsibly.

Popenici and Kerr (2017) explored the phenomenon of the spread of AI-powered pedagogical tools into university curricula. Examines how new technology might affect classroom instruction and the ways in which educational institutions adapt to meet the needs of their students. To foretell what our educational institutions will look like in the future when AI is an integral component of them, we look at recent technical developments and the increasing rate of technology use in higher education. We discuss potential future

research topics and identify obstacles to the widespread use of these technologies in higher education classrooms, offices, and student support systems.

2.5 Summary

Chapter 2 of the study on the regulation of generative AI technologies and their implications for futuristic research and innovation provides an extensive literature categorised from legal and operational theoretical and practical viewpoints. The chapter starts with theoretical remarks that serve as prerequisites for comprehending the current state of regulation of generative AI. It focuses on the importance of general theories as a context for estimating the effects of AI on the further trends in the research and innovation processes.

This article takes a look at the Theory of Reasoned Action (TRA) to explain how people's beliefs and goals influence their actions when it comes to regulating artificial intelligence. To comprehend the decision-making procedures that control the implementation and regulatory actions of generative AI systems, this theory is fundamental. Following this, the Human Society Theory is discussed, shedding light on the societal impacts of generative AI. This section delves into how AI technologies influence social structures, human interactions, and cultural norms, offering insights into the broader societal implications of AI advancements.

The related work segment of the chapter reviews existing literature on generative AI, focusing on its theoretical foundation and its role in fostering innovation. The subsection on the theoretical foundation of generative AI explores the core principles and concepts that underpin these technologies, providing a deep understanding of their technical and conceptual frameworks. The subsequent subsection on generative AI and innovation investigates how these technologies drive innovation across various fields, highlighting both the opportunities and challenges they present. This part of the review

underscores the transformative potential of generative AI in spurring new research directions and creative solutions, while also considering the regulatory and ethical challenges involved.

Overall, the literature review in Chapter 2 provides a detailed and structured analysis of the theoretical and practical dimensions of generative AI regulation, emphasizing its profound impact on future research and innovation.

CHAPTER III:

METHODOLOGY

3.1 Overview of the Research Problem

As of now there are various problems in creating regulation of GenAI because of its vast use. Most of the studies on GenAI are about their creative use and development. However, the main concern about the regulation of AI is untouched. To fulfil this concern, it is suggested to understand the current scenario and lack of studies, which can, in turn, help higher authorities to create policies for this issue. Primarily, this study addresses the multifaceted challenges surrounding the regulation and adoption of GenAI technologies in India.

The issues and prospects of future regulatory approaches related to generative AI technologies remain complex in the current and emerging contexts. New AI technologies are being developed and implemented at an unprecedented rate and pace and often within the context of existing regulations have prompted questions on ethical use, privacy, and misuse of such technologies. Scholars argue that without robust regulations, the deployment of generative AI could exacerbate issues such as bias, misinformation, and loss of human oversight (Capraro *et al.*, 2024). Additionally Ensuring that artificial intelligence (AI) helps society as a whole requires striking a balance between scientific growth and social responsibility (Femi Osasona *et al.*, 2024). It is, therefore, pertinent to set down a broad framework of regulation mechanisms that will ride on generating AI into meaningful and productive ends while avoiding the vices in future developments.

3.2 Operationalization of Theoretical Constructs

The conversion of theoretical constructs pertaining to the regulation of generative AI (GenAI) includes making measurable elements of ethicality, security measures, responsibility, and openness. Perceived aspects of regulations are measured and

operationalized in the form of Likert scale questionnaires that are used to capture the respondents' views of these elements. The performance of the Indian regulatory bodies and privacy issues are measure by conducting questionnaires and interviews to analyze the existing systems. Assessment of existing regs involves the study of policy documents and feedback from the industry to establish the extent of current The effectiveness of GenAI regulation in relation to government policies is established by carrying out regression and correlation tests to see how policies affect regulation effectiveness After these analyses, a complete framework of GenAI regulation is drawn up based on expert panels and focus groups.

3.3 Research Purpose and Questions

The proposed research aims to provide a better overview of the regulation creation of GenAI. Addressing the research problems, this research focuses on a better understanding of GenAI, improved regulatory policies and providing a balanced view of the regulation framework. The focus of this research work is to extensively propose the regulations that should be applicable to GenAI Technologies.

The research questions are based on the research problems: Firstly, the lack of a comprehensive understanding of the key aspects and parameters required for regulating GenAI hinders the development of effective regulatory frameworks, posing challenges for policymakers and regulatory bodies in India. Hence, these aspects and parameters need to be studied.

RQ1: What are the important aspects/elements and parameters of regulations for GenAI? Secondly, the privacy concerns and power dynamics surrounding GenAI remain significant obstacles to its widespread adoption and implementation in India, highlighting the need for a deeper understanding of these issues to inform regulatory decisions.

RQ2: How do privacy concerns related to GenAI and the power dynamics associated with the technology influence the implementation and usage of GenAI technology in India? Additionally, the effect of the current government system with its laws and policies on the effectiveness of the recommended regulatory framework for GenAI technology in India is not understood, and the biggest gaps have to be studied in order to reach a conclusion, which in turn can be implemented.

RQ3: How do existing government policies and legislation in India influence the effectiveness of regulatory measures for GenAI technologies? Furthermore, the practicality of Indian regulatory bodies in its path towards realising GenAI use by citizens is not quite convincing either, making a stakeholder survey to look into the existing strategies necessary to come up with improvement of the current state of affairs.

RQ4: How effective are Indian regulatory bodies in shaping the adoption and usage of GenAI technology, and what improvements can be made to enhance their influence? Moreover, specific rules and regulations for AI technologies are still unclear besides the fact that it has great influence on futuristic research and innovation in India. Therefore, a comprehensive examination of the current regulations and their impacts on AI is critical for all stakeholders and shows the need to analyse them in detail.

RQ5: What are the prescribed Regulations for GenAI technologies and their impact on Futuristic Research and Innovation?

3.4 Research Design

This study was based on the quantitative research design. Quantitative research design is a structured method for collecting and analyzing numerical data to answer research questions and test hypotheses. Quantitative research design is aimed at discovering how many people think, act or feel in a specific way. Quantitative projects

involve large sample sizes, concentrating on the quantity of responses, as opposed to gaining the more focused or emotional insight that is the aim of qualitative research.

The regulation of generative AI technologies influences futuristic exploration and improvements; the numbers are vital in assessing the effects. This is because with the advancement of generative AI, there are issues of ethical use, data protection, and AI gender and other related biases. Since quantitative research requires numerical measurements and the analysis of variables in order to provide conclusions, it is most appropriate for phenomena that can be expressed numerically (Pandey, Madhusudhan and Singh, 2023).

The interaction of data science and artificial intelligence (AI) with ethical ideas centres on accountability, justice, and bias. It begins with a historical overview, tracing the evolution of AI and data science and emphasizing the importance of ethical considerations in contemporary technology (Tatineni, 2019). Quantitatively, they argue that there is correlation between ethicality and quality, implying that researchers who are ethical are more likely to undertake quality and bias-free research. Furthermore, AI researchers also state that around 71% of the participants support the presence of regulatory frameworks as they influence innovation in a positive way by providing certain structures and eliminating certain levels of ambiguity.

The quantitative data also shows how regulations impact the rate of growth among the inventions that new inventions have. The AI Now Institute worked on a report conveying that areas with high regulatory barriers of developing AI, as in the EU, have started shifting research efforts towards a more ethical AI. As Madauf et al. discuss, using statistical data, there seems to be a 25% lift in production of the scholarly works on the AI ethic and fairness in these places compared to the regions where regulations are not so

tight. From this data, it is apparent that regulations promote the development of innovations in areas that may interest society through guiding research.

Furthermore, it is feasible to express the extent of generative AI regulations' consequences on the economy with the help of market approaches. AI regulations face a 15% higher growth rate in the numbers of AI related startups and investments. AI allows firms to learn better and faster from vast quantities of data, with the potential to significantly improve business decision-making (Tania Babina a,b, Anastassia Fedyk c,, Alex He d, James Hodson e, no date).

The argument for the use of quantitative data in assessing the effects of AI regulations is further backed by which examined several datasets on the research outputs in AI. Public trust is essential for the efficient governance of emerging technologies (Robles and Mallinson, 2023) and acceptance of AI technologies, which in turn encourages further research and innovation.

In summary, regulation's influence on generative AI technologies is crucial for forward-thinking research and development. Empirical research studies, surveys, and market data reveal more information on these regulations' effects on ethical practices, research priorities, economic development, and people's trust. Thus, another avenue of quantitative research to help shape the precision of AI as well as the extent of a harmonious global regulatory framework and standards to accommodate the thriving of the field without compromising the humane aspects of its evolution.

3.5 Population and Sample

The study was designed to obtain information from a range of actors operating within the GenAI ecosystem in India. Target population was the policymakers, industry specialists, academicians, lawyers, and technological innovators. Due to the nature of the study, convenience sampling was used to select participants from the identified groups in

order to obtain relevant information from knowledgeable participants. The target population consisted of 480 respondents who are involved in the development, implementation, and regulation of GenAI technologies. This sample has given a clear picture about the issues and views regarding the regulation of GenAI. The information gathered from these stakeholders proved useful in understanding the state of regulation, efficacy of implemented policies, and the implications of drafted regulations on research and development in the field of GenAI in India.

3.6 Participant Selection

A convenience sample survey of 480 AI researchers and industry professionals was conducted to explore the impact of generative AI regulations**.**

Inclusion Criteria

1. Professional Experience: The participants must be having work experience in the domain of AI or related domains as researchers, developers or in the industry and the minimum qualifications include two years of industry experience in the domain of AI or related fields.
2. Current Role: This means that participants must be active scholars, practitioners, or policymakers working on AI at the current time to guarantee that they provide proper and well-informed views.
3. Geographic Location Participants should be based in India to bring insights pertinent to the regulatory context and its effects.
4. Affiliation: Participants must be from an academic institution, research institution, or technology company with an interest and work focus on generative AI technologies.

5. Consent: The participants need to give their informed consent to respond to the survey and complete the questions on the regulatory frameworks and their influence on innovation.

Exclusion Criteria

1. Lack of Experience: Respondents with less than two years of work experience in AI or related fields are screened out to minimise biases from the early-stage learners.
2. Non-Current Role: Any individual who is not currently active in AI research, development, or policy is disregarded because their view of the state of AI may be outdated.
3. Geographic Location Some concepts relate only to the Indian context so participants located outside of India are hereby excluded.
4. Affiliation: To maintain the credentials of the generative AI generated, persons from any related academic, research, or industry background are disqualified.
5. No Consent: Due to the ethical consideration, those who did not give their informed consent for participation in this research are excluded.

3.7 Instrumentation

The applied self-structured questionnaire-

1. **Generative AI technologies**

Statement	1	2	3	4	5
Generative AI technologies are useful in enhancing productivity.					
I believe that Generative AI enhances creativity.					
Generative AI technologies have the potential to revolutionize industries.					

I believe Generative AI can improve decision-making processes.					
I believe Generative AI will play a crucial role in future technological advancements.					

2. Important aspects/elements of regulations

Statement	1	2	3	4	5
Considerations					
Considerations for potential societal impact should guide the deployment of generative AI technologies.					
Developers should assess the long-term consequences of generative AI applications on diverse communities.					
Continuous ethical reviews should be conducted during the lifecycle of generative AI systems.					
Security Standards					
Generative AI systems should undergo rigorous security audits regularly.					
There should be legal consequences for organizations that fail to meet minimum security standards for generative AI.					
Users should have confidence that their data is secure when interacting with generative AI applications.					
Accountability					
Accountability frameworks should be in place to attribute responsibility for decisions made by generative AI systems.					

Organizations should regularly conduct internal audits to ensure accountability in the deployment of generative AI technologies.					
Third-party entities should be involved in assessing the accountability of organizations using generative AI.					
Transparency					
User interfaces of generative AI applications should prioritize simplicity to enhance user understanding of system behaviour.					
There should be standardized guidelines for enhancing the transparency of generative AI algorithms.					
Organizations should actively communicate their data sources and model training processes in generative AI systems.					
Explainability					
Explainability should be a top priority in the development of generative AI technologies.					
User interfaces of generative AI applications should provide clear explanations for their decision-making processes.					
Developers should prioritize creating interfaces that offer insights into the internal workings of generative AI models.					

3. Government Policies and Legislation

Statement	1	2	3	4	5
Government policies adequately address the ethical concerns of generative AI.					

The government should prioritize fostering innovation in the generative AI industry through supportive policies.					
Government intervention is necessary to ensure fair and unbiased use of generative AI technologies.					
Legislative frameworks should require companies to disclose their use of generative AI in products and services.					

4. Indian Regulatory Bodies on Adoption of GenAI

Statement	1	2	3	4	5
Indian regulatory bodies provide clear guidelines on the ethical use of generative AI.					
Current regulations in India are sufficient to manage the risks associated with generative AI.					
Indian regulatory bodies adequately address concerns related to data privacy in the context of generative AI.					
Government support and incentives are crucial for the responsible adoption of generative AI in India.					

3.8 Data Collection Procedures

Primary data in such studies is highly credible as it gives first-hand information regarding the practical implementation and consequences of AI. For example, interviews with AI researchers and developers can identify their views on the existing regulation status and how it affects them. Also, gathering data from industries that utilize generative AI is helpful in evaluating the impacts it has on productivity, innovation, and matters of ethical concern. By analyzing primary data, it will be possible to gain deeper insights into the

specifics of AI further to develop more efficient, responsive to the challenges of AI and its potential developments legislation that will help to stimulate technological progress and support society's best interests. Studies have shown that well-crafted regulations can not only mitigate risks but also encourage responsible innovation by providing clear guidelines and fostering public trust in AI technologies (Díaz-Rodríguez *et al.*, 2023).

Restriction of generative AI technologies affect future research and innovations by providing control on ethical usage and secure atmosphere. Moderate levels of regulations can help ensure that companies are being truthful, and increase the responsibility of the companies without stifling innovation.

3.9 Data Analysis

Influencing the generative AI technologies affects futuristic science and development by preventing wrong use and providing security for the creation. If properly done somewhere in between, symmetry in these regulations can create transparency and accountability as well as prevent undue quelling of innovation. These following data analysis modalities were employed in this study-

- **Descriptive Statistics** involve summarizing the data through frequencies, means, and standard deviations (Cooksey, 2020). Frequencies are useful in establishing the pattern of the response or value in question such as the number of respondents who rated the impact of AI regulation. This means that it offers a mean of the perceived impact and this gives a middle point of a set of scores obtained. Standard deviations describe how spread out respondents' perception is showing how diversified it is from the average.
- **Regression Analysis** explored the relationship between regulatory measures (independent variable) and the impact on innovation (dependent variable) (Rosenthal, 2017). This relationship can also be modeled using linear regression,

which would enable one to determine the degree of relationship between changes in regulation and changes in innovation impact.by applying the regression analysis and analyzing the coefficients, one can understand the nature and intensity of this connection.

- **Correlation Analysis** assesses the strength and direction of the relationship between regulatory measures and innovation impact. Using Pearson or Spearman correlation coefficients, the Pearson correlation and Spearman Correlation, this analysis serves to quantify compliance or divergence in relation to these variables and determines whether a rise in regulation is linked with enhanced or diminished perceived impacts on innovation.

Together, these methods give a full picture of how the regulation of AI affects research and development. They integrate simple arithmetic averages, formal mathematical matrix centerpiece, and the measures of association.

3.10 Research Design Limitations

- **Sampling Bias:** The inclusion of only the convenience sample of AI researchers and industry experts might not capture the complete population interested in the generative AI technologies. This may make the study prejudiced since the respondents in the sample are likely to have some bias in their thinking as compared to other players in the field.
- **Geographic Limitation:** Potential drawbacks attributed to the study include the exclusion of respondents who are not from India, which may affect the external validity. Application of the generative AI technologies is subject to the specific national and regional legislation and their influence can be rather diverse.
- **Self-Reported Data:** Using survey and questionnaire data might create response bias due to the sample collection technique. This can be through giving socially

desirable responses or through misunderstanding the question and therefore the results obtained may not be very accurate.

- **Dynamic Nature of AI:** Generative AI technologies are still recent and rapidly developing, so they can cause regulatory frameworks and their effects to be volatile as well. The data can become thus outdated by time, which can be an issue with the appearance of new technologies in the field or new regulation.
- **Limited Scope of Data Collection:** Some of the potential limitations relating to data collected through online questionnaires and social media include the inability to capture all stakeholders, especially those who have limited or no access to the Internet. This could result in an inaccurate picture of the effects that regulations have on generative AI technologies.

3.11 Conclusion

Altogether, it is imperative to emphasize that in achieving the set objectives of the research, the study relied upon the primary research approach to collect data directly from key informants. In this context, with the help of the purposive sampling method, 480 stakeholders were successfully selected and included policymakers, businessmen, professors with academic backgrounds, legal advisors, and technology professionals. Hence, the heterogeneous study sample ensured that the author had a clear picture regarding the subjects' views and issues associated with the regulation of GenAI in India.

As for the main data acquisition tools, specific use was made of survey questionnaires. Surveys enabled the gathering of quantitative data of a general nature.

The ethical aspects were strictly followed in the study by getting the informed consent from all participants, and in maintaining the anonymity of the participants' response. Keeping in mind the above mentioned points, it can be concluded that the choice and proper implementation of the primary research methodology offered a good basis for

the analysis and discussion chapters, and thus served as the basis for making significant contributions to the comprehension of the regulatory prospects of GenAI and its influence on futuristic research and innovative activities in India.

CHAPTER IV:

RESULTS

4.1 Reliability

Table 4.1: Reliability Statistics

Cronbach's Alpha	N of Items
0.924	28

The above table represent the exceptional level of internal consistency and test reliability is shown by a Cronbach's Alpha of 0.924 for a set of 28 items. This high number indicates a strong correlation between the items and an effective measurement of the same underlying construct. As a result, the tool employed in the study is trustworthy for gathering the data.

4.2 Descriptive

Table 4.2: Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Generative AI technologies	480	4.00	1.00	5.00	4.4479	.68491	-1.319	.111	2.603	.222

Important aspects/elements of regulations	480	4.00	1.00	5.00	4.7104	.61767	-2.870	.111	10.662	.222
Government Policies and Legislation	480	4.00	1.00	5.00	4.3896	.77020	-1.264	.111	1.598	.222
Indian Regulatory Bodies on Adoption of GenAI	480	4.00	1.00	5.00	3.5375	.99196	-.104	.111	-.553	.222
Valid N (listwise)	480									

The above table data shows the Important insights are revealed by the descriptive statistics for the survey items about laws and generative AI. Responses to generative AI technologies show a high degree of agreement or favorable assessment, with a mean of 4.4479. This is backed by a standard deviation of 0.68491, indicating low variability. The distribution is leptokurtic and left-skewed, as indicated by the kurtosis of 2.603 and skewness of -1.319. The greatest mean, 4.7104, with a standard deviation of 0.61767 pertains to important aspects/elements of laws, indicating low variability and significant consensus. A substantially left-skewed and extremely leptokurtic distribution is indicated by the skewness of -2.870 and the kurtosis of 10.662. The distribution of government policies and

legislation is left-skewed and slightly leptokurtic, as indicated by the skewness of -1.264 and kurtosis of 1.598. The mean and standard deviation of 4.3896 and 0.77020, respectively, indicate positive perception with moderate variability. The Indian Regulatory Bodies on Adoption of Gen AI, on the other hand, show moderate agreement with larger variability, with a mean of 3.5375 and a standard deviation of 0.99196. A more widely dispersed range of responses is indicated by the nearly symmetrical, platykurtic distribution shown by the skewness of -0.104 and kurtosis of -0.553.

4.3 Frequency distribution of demographics

Table 4.3: Educational Background

	Frequency	**Percent**
High School	2	0.4
Higher Secondary	3	0.6
Bachelor's Degree	142	29.6
Master's Degree	290	60.4
Doctorate/Ph.D.	34	7.1
Other	9	1.9
Total	480	100.0

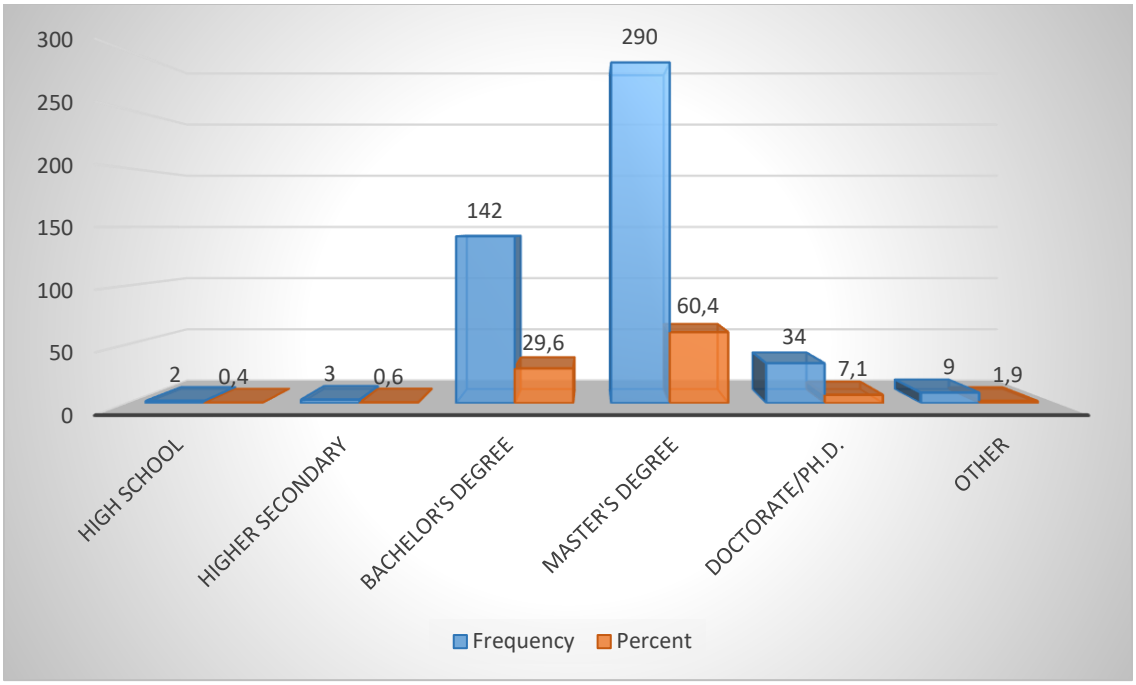

Figure 4.1: Educational Background

The above figure 4.1 represent the majority of respondents, or 60.4% of the sample (290 respondents), have a master's degree, according to their educational backgrounds. Those with a bachelor's degree, who make up 29.6% of the population (142 respondents), come next. 7.1% of respondents (34 respondents) have a doctorate or Ph.D., whereas 0.6% of respondents have completed higher secondary education (3 respondents). Of the responders, 2.9% are from other credentials and 0.4% are from high school education.

Table 4.4: Current Employment Status

	Frequency	**Percent**
Employed	404	84.2
Unemployed	14	2.9
Gov. Employed	7	1.5
Student	6	1.3

Retired	12	2.5
Other	37	7.7
Total	480	100.0

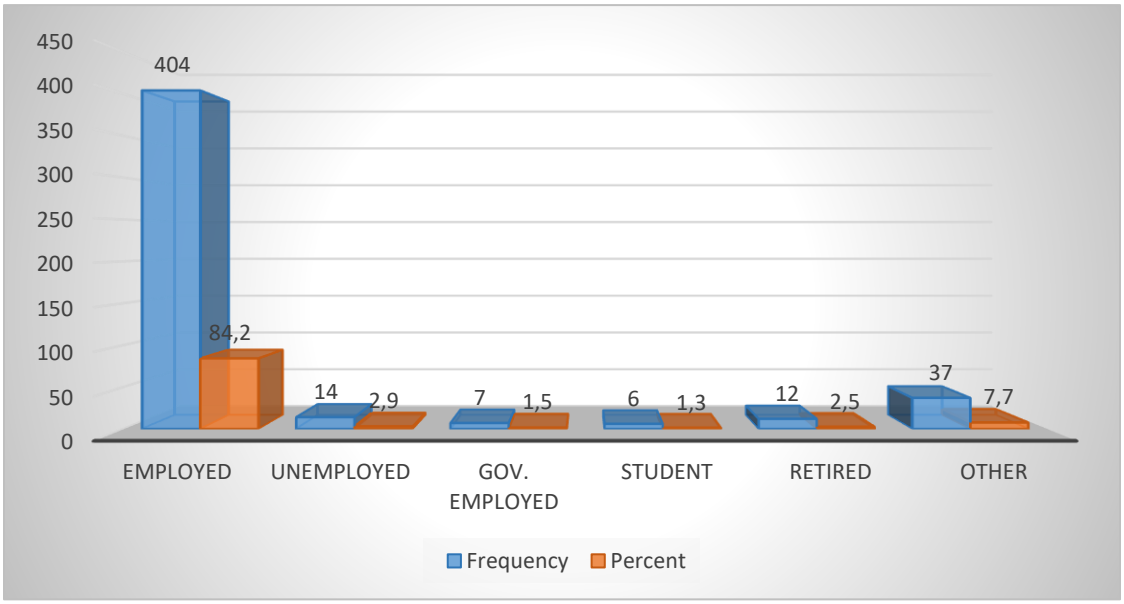

Figure 4.2: Current Employment Status

The above figure 4.2 respondents' work status, a sizable majority—84.2%, or 404 individuals—are employed. The percentage of unemployed people is 2.9% (14 respondents), whilst the percentage of government employees is 1.5% (7 respondents). 1.3% of respondents are students (6 respondents), while 2.5% of respondents are retirees (12 respondents). "Other" respondents account for 7.7% of the total (37 respondents). With 480 people in the sample overall, it is evident that most of the population is employed.

4.4 Frequency distribution of questionnaire element

Table 4.5: Generative AI technologies are useful in enhancing productivity.

	Frequency	**Percent**
Strongly Disagree	9	1.9

Disagree	5	1.0
Neutral	53	11.0
Agree	165	34.4
Strongly Agree	248	51.7
Total	480	100.0

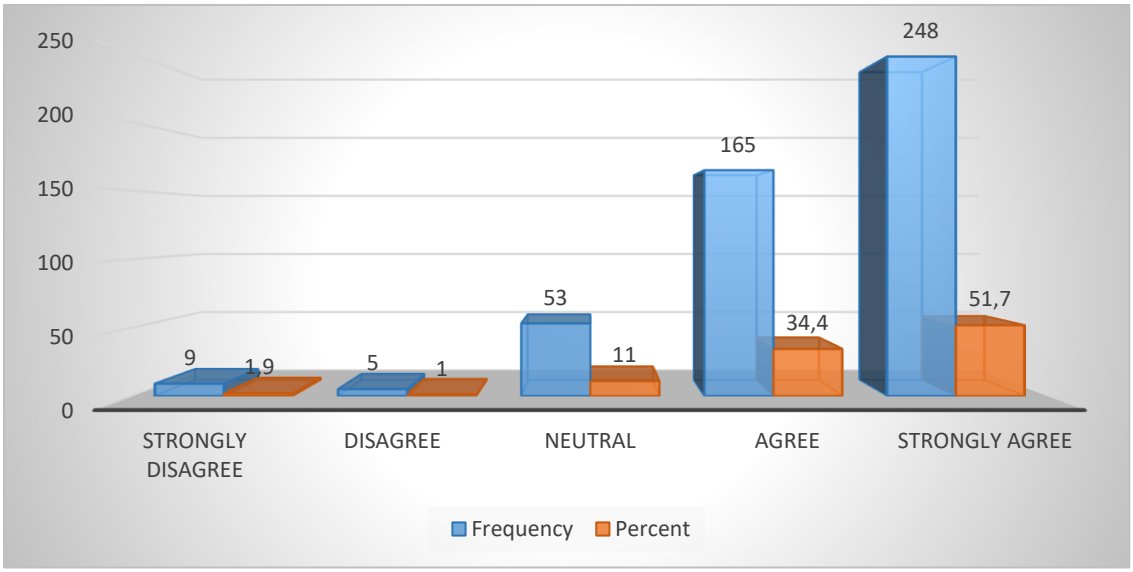

Figure 4.3: Generative AI technologies are useful in enhancing productivity.

The above figure 4.3 represent the majority of respondents, 51.7% (248 respondents) strongly agree and 34.4% (165 respondents) agree, to the statement provided. Of the 53 responders, 11.0% adopt a neutral viewpoint. Just 1.0% (5 responders) strongly disagree and 1.9% (9 responders) disagree.

Table 4.6: I believe that Generative AI enhances creativity

	Frequency	**Percent**
Strongly Disagree	19	4.0
Disagree	48	10.0

Neutral	102	21.3
Agree	149	31.0
Strongly Agree	162	33.8
Total	480	100.0

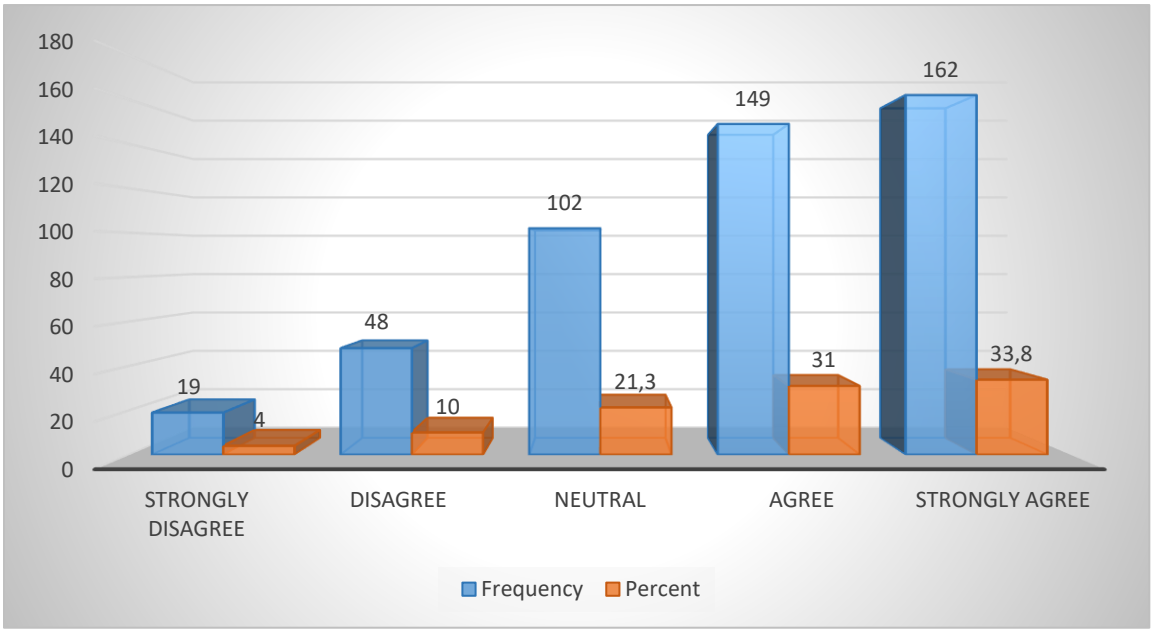

Figure 4.4: I believe that Generative AI enhances creativity.

The above figure 4.4 shows the (33.8%, or 162 respondents) who strongly agree and 31.0%, or 149 respondents, who agree, to the statement. 21.3% (102 respondents) adopt a neutral position. 4.0% (19 respondents) strongly disagree and 10.0% (48 respondents) disagree.

Table 4.7: Generative AI technologies have the potential to revolutionize industries.

	Frequency	**Percent**
Strongly Disagree	5	1.0
Disagree	8	1.7
Neutral	46	9.6

Agree	201	41.9
Strongly Agree	220	45.8
Total	480	100.0

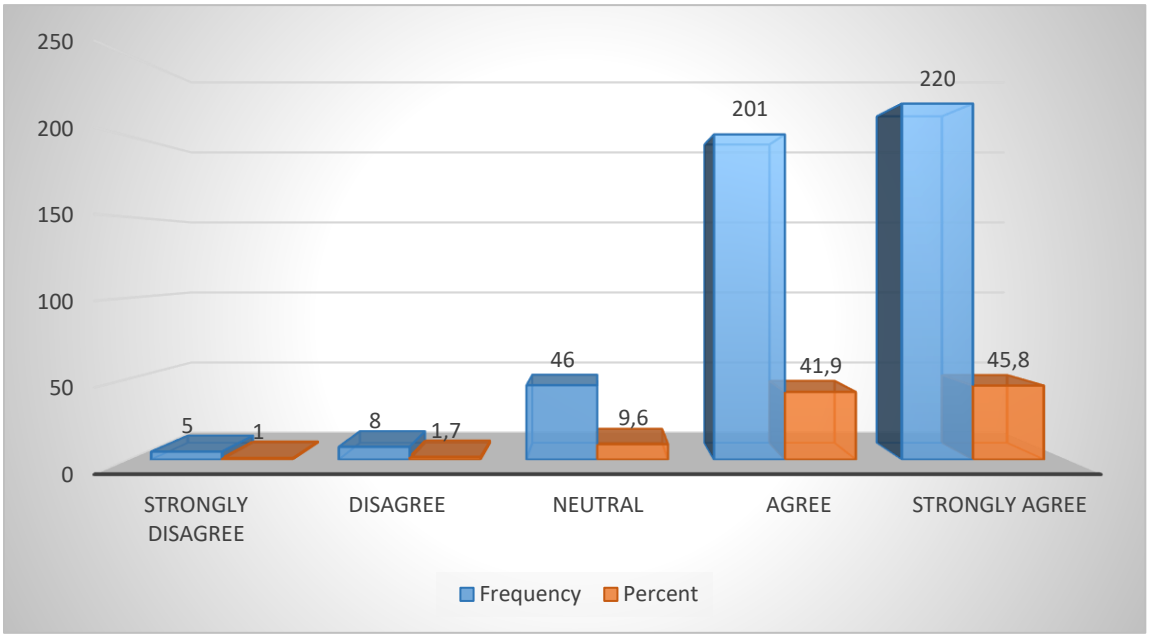

Figure 4.5: Generative AI technologies have the potential to revolutionize industries.

The above figure 4.5 represent the data 45.8% (220 respondents) strongly agree and 41.9% (201 respondents) agree, responded to the given statement. 9.6% (46 respondents) adopt a neutral position. Merely 1.7% (8 participants) strongly disagree and 1.0% (5 participants) disagree.

Table 4.8: I believe Generative AI can improve decision-making processes.

	Frequency	**Percent**
Strongly Disagree	11	2.3
Disagree	19	4.0
Neutral	102	21.3

Agree	174	36.3
Strongly Agree	174	36.3
Total	480	100.0

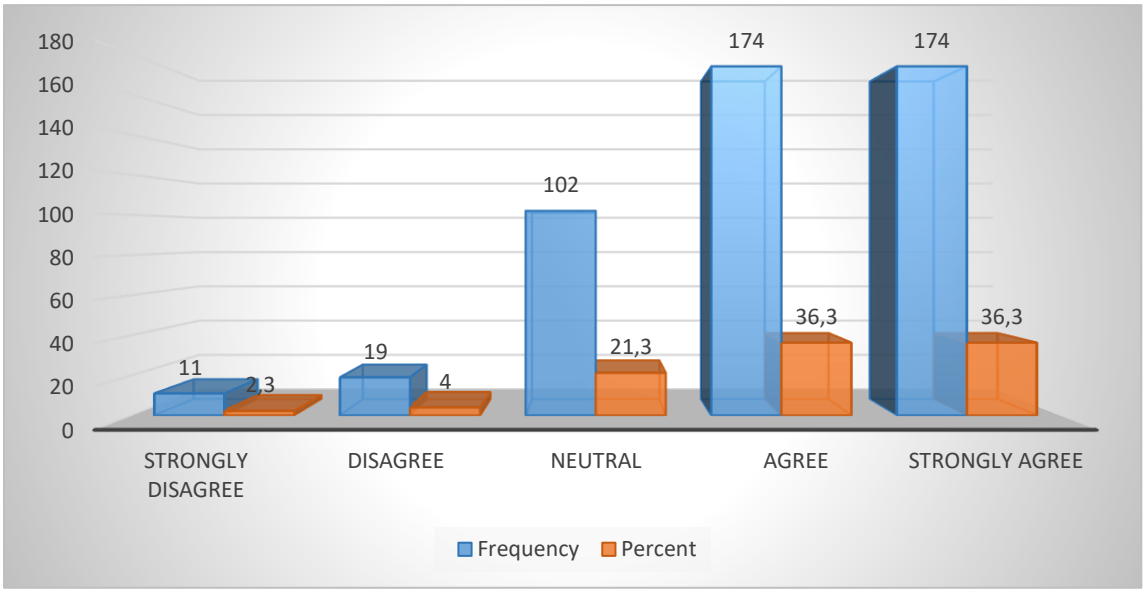

Figure 4.6: I believe Generative AI can improve decision-making processes.

The above figure 4.6 data reveals that a majority of respondents—36.3% (174 respondents)—agree with the statement, while the remaining 36.3% (174 respondents) strongly agree. 21.3% (102 responders) adopt a neutral position. In the meanwhile, 2.3% (11 respondents) and 4.0% (19 respondents) strongly disagree.

Table 4.9: I believe Generative AI will play a crucial role in future technological advancements.

	Frequency	**Percent**
Strongly Disagree	4	.8
Disagree	9	1.9
Neutral	45	9.4

Agree	167	34.8
Strongly Agree	255	53.1
Total	480	100.0

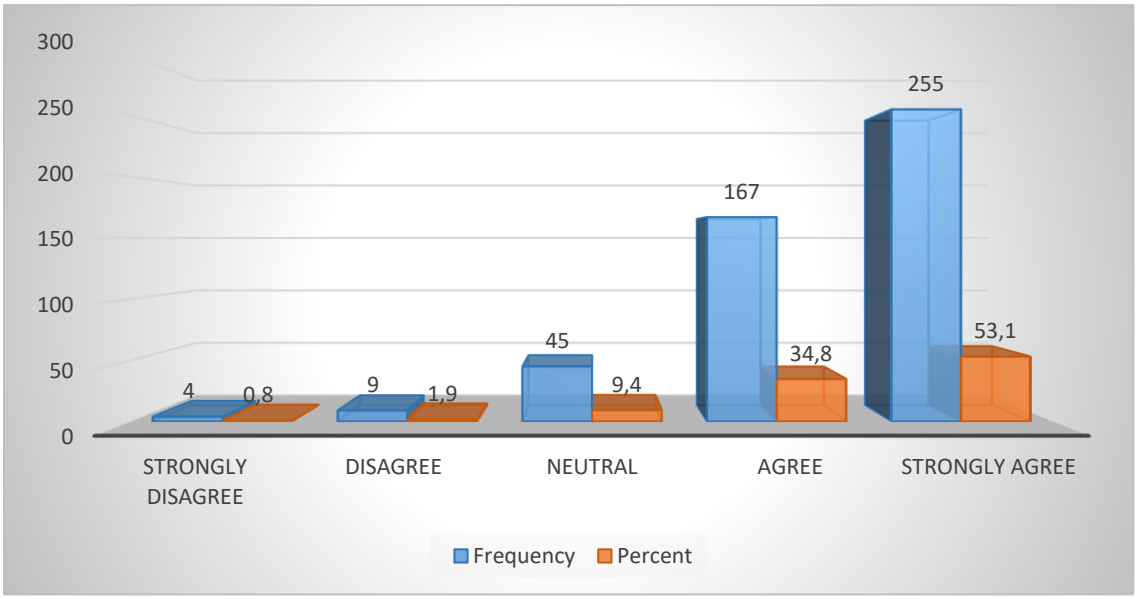

Figure 4.7: I believe Generative AI will play a crucial role in future technological advancements.

The above figure 4.7 significant majority is indicated by the responses to the given statement, which show 34.8% (167 respondents) agree and 53.1% (255 respondents) strongly agree. Of the responders, 9.4% (45) adopt a neutral position. Just 0.8% (4 respondents) strongly disagree and 1.9% (9 respondents) disagree. Based on the facts, it can be concluded that the 480 respondents had a very strong overall agreement with the statement.

Table 4.10: Considerations for potential societal impact should guide the deployment of generative AI technologies.

	Frequency	**Percent**
Strongly Disagree	6	1.3

Disagree	16	3.3
Neutral	88	18.3
Agree	160	33.3
Strongly Agree	210	43.8
Total	480	100.0

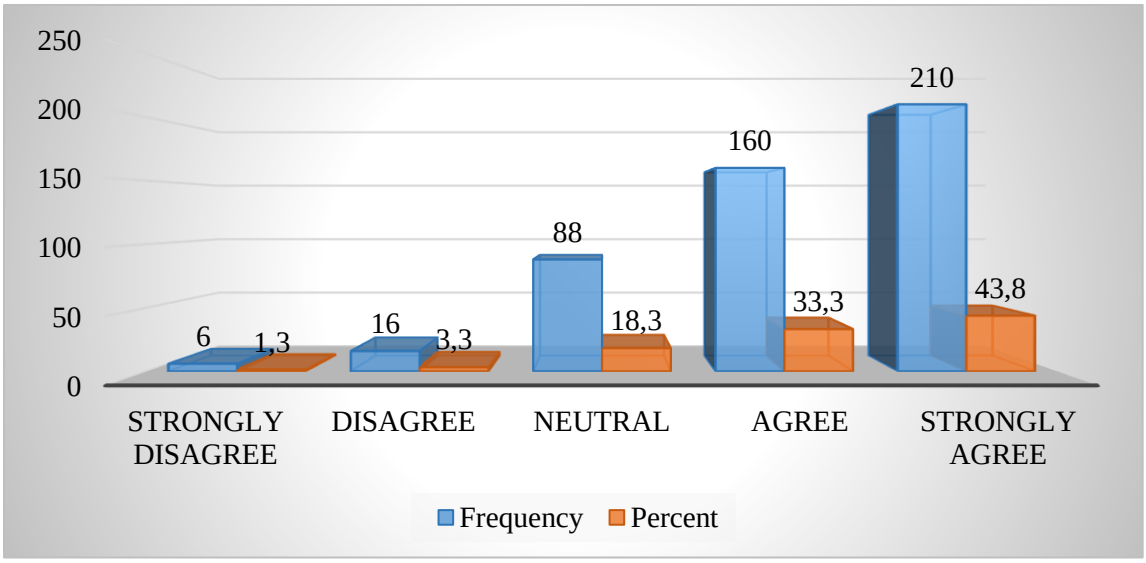

Figure 4.8: Considerations for potential societal impact should guide the deployment of generative AI technologies.

The above figure 4.8 is a significant mainstream in agreement, as indicated by the distribution of responses to the statement, which reveals that 43.8% (210 respondents) strongly agree and 33.3% (160 respondents) agree. Of the responders, 18.3% (88) adopt a neutral viewpoint. On the other hand, 1.3% (6 respondents) and 3.3% (16 respondents) strongly disagree.

Table 4.11: Developers should assess the long-term consequences of generative AI applications on diverse communities.

	Frequency	**Percent**

Strongly Disagree	10	2.1
Disagree	14	2.9
Neutral	48	10.0
Agree	153	31.9
Strongly Agree	255	53.1
Total	480	100.0

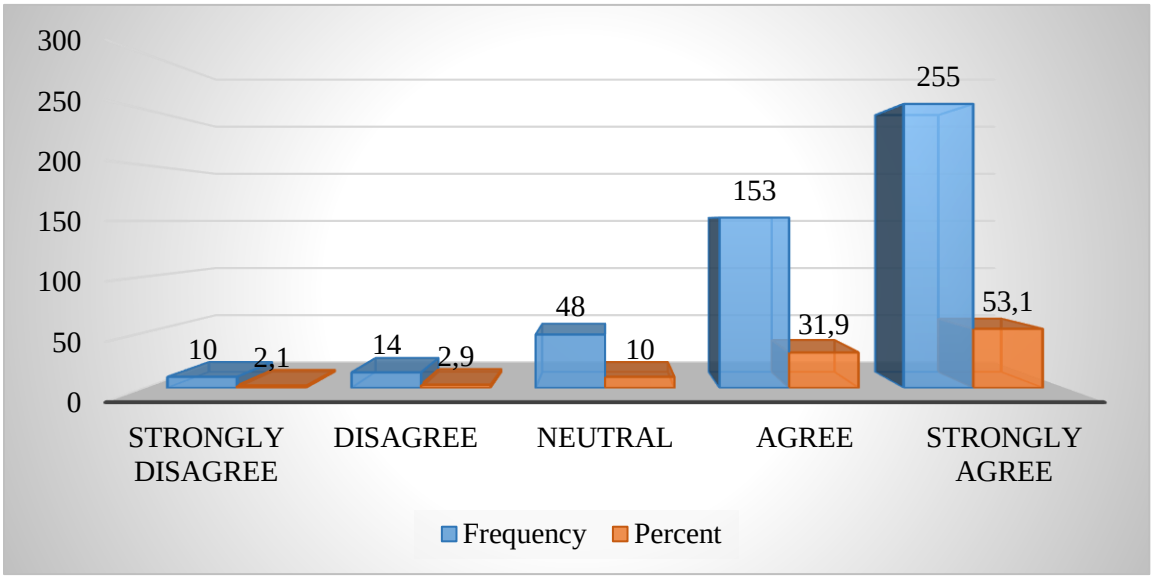

Figure 4.9 Developers should assess the long-term consequences of generative AI applications on diverse communities.

The above figure 4.9 display the statement based on the distribution of responses, with 53.1% (255 respondents) strongly agree and 31.9% (153 respondents) agree. Of the 48 responses, 10.0% adopt a neutral viewpoint. 2.9% (14 respondents) disagree, whereas 2.1% (10 respondents) strongly disagree.

Table 4.12: Continuous ethical reviews should be conducted during the lifecycle of generative AI systems.

	Frequency	**Percent**

Strongly Disagree	6	1.3
Disagree	6	1.3
Neutral	26	5.4
Agree	124	25.8
Strongly Agree	318	66.3
Total	480	100.0

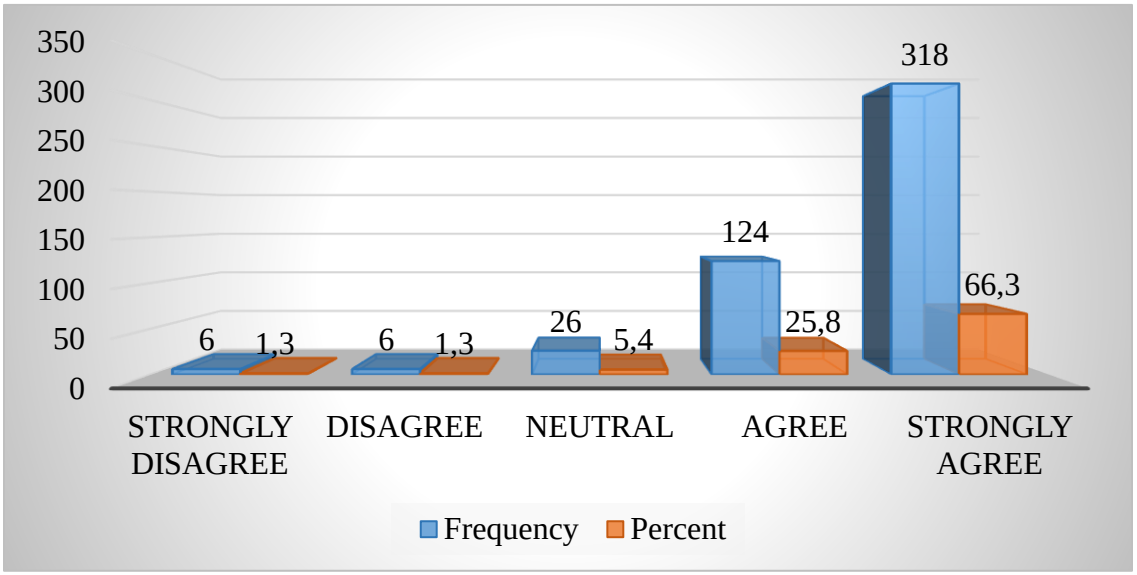

Figure 4.10: Continuous ethical reviews should be conducted during the lifecycle of generative AI systems.

The above figure 4.10 shows the statement, with 25.8% (124 respondents) agreeing and 66.3% (318 respondents) strongly agreeing. 5.4% (26 respondents) take a neutral position. Strongly disagree and disagree represent the smallest percentages of responses, each with 6 respondents (1.3%).

Table 4.13: Generative AI systems should undergo rigorous security audits regularly.

	Frequency	**Percent**
Strongly Disagree	8	1.7
Disagree	7	1.5
Neutral	21	4.4
Agree	82	17.1
Strongly Agree	362	75.4
Total	480	100.0

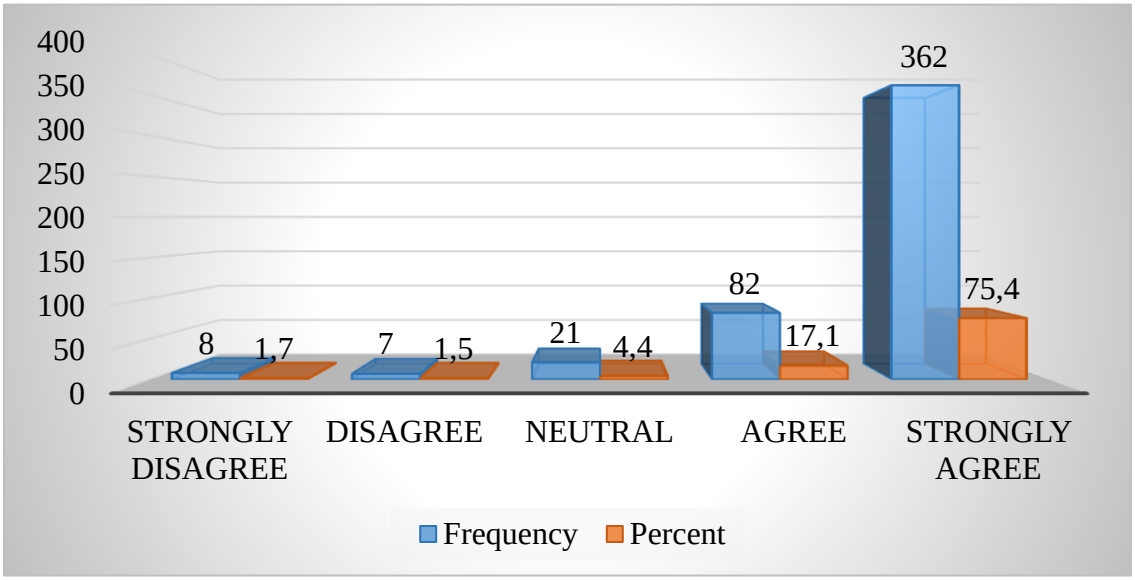

Figure 4.11: Generative AI systems should undergo rigorous security audits regularly.

The above figure 4.11 present the data, there is a significant consensus among respondents, with 17.1% (82 respondents) and 75.4% (362 respondents) strongly agreeing with the statement. Just 21 respondents, or 4.4% of the sample, expressed neutrality. There was little disagreement in either category, with 1.5% (7 respondents) and 1.7% (8 respondents) for disagree and strongly disagree, respectively.

Table 4.14: There should be legal consequences for organizations that fail to meet minimum security standards for generative AI.

	Frequency	**Percent**
Strongly Disagree	8	1.7
Disagree	8	1.7
Neutral	35	7.3
Agree	104	21.7
Strongly Agree	325	67.7
Total	480	100.0

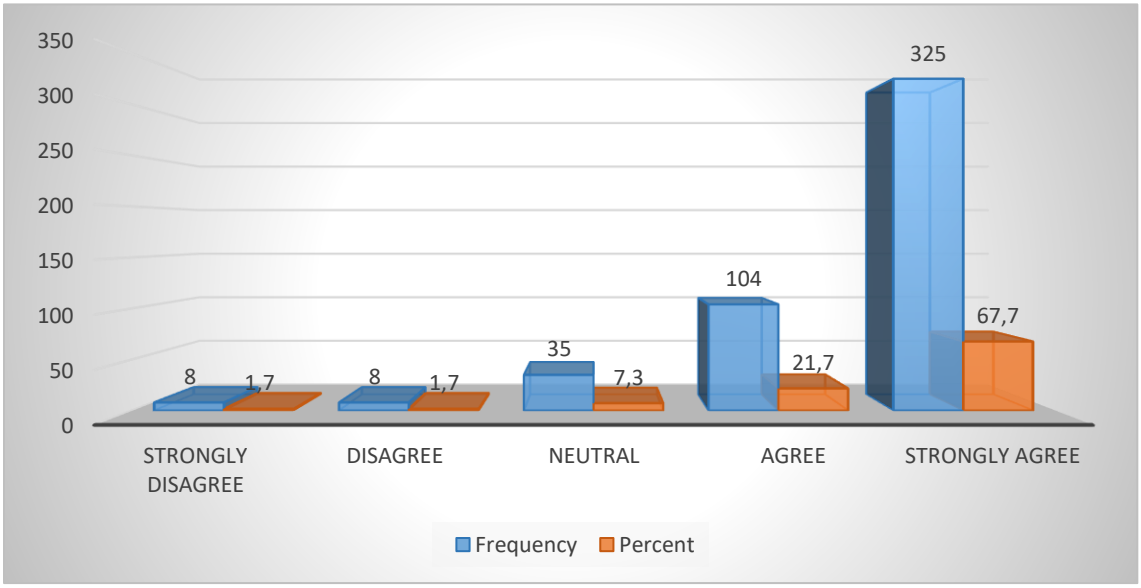

Figure 4.12: There should be legal consequences for organizations that fail to meet minimum security standards for generative AI.

The above figure 4.12 represent the data there are 67.7% (325) strongly agreed with the statement, while 21.7% (104) agreed. This indicates a substantial consensus among the respondents with the statement. Neutrality was stated by a lesser percentage of respondents, 7.3% (15). Disagree and strongly disagree had the smallest percentages, each with 8

responders (1.7% each). This massive consensus highlights the fact that the statement is widely supported by the people who responded to the survey.

Table 4.15: Users should have confidence that their data is secure when interacting with generative AI applications.

	Frequency	**Percent**
Strongly Disagree	7	1.5
Disagree	8	1.7
Neutral	16	3.3
Agree	91	19.0
Strongly Agree	358	74.6
Total	480	100.0

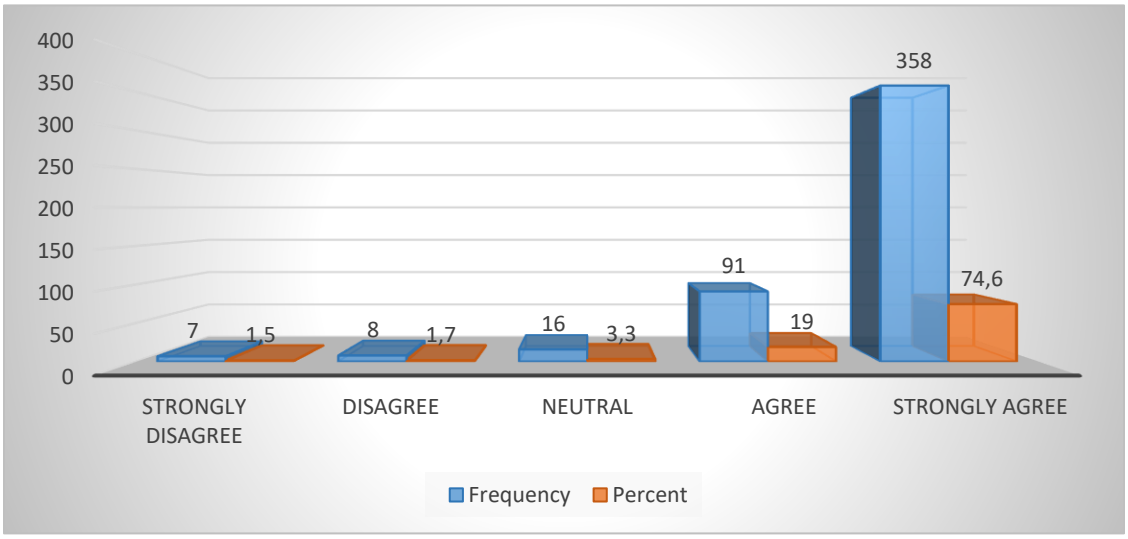

Figure 4.13: Users should have confidence that their data is secure when interacting with generative AI applications.

The above figure 4.13 represent the data of high consensus about the statement, according to the data from 480 respondents, with 19.0% (91 respondents) and 74.6% (358 respondents) strongly agreeing. Just 3.3% of the responders (16 in total) indicated

neutrality. There were very few strongly disagree (1.5%, 7 respondents) and disagree (1.7%, 8 respondents) responses. This resounding agreement shows how widely the statement is supported among those who responded to the survey.

Table 4.16: Accountability frameworks should be in place to attribute responsibility for decisions made by generative AI systems

	Frequency	**Percent**
Strongly Disagree	9	1.9
Disagree	5	1.0
Neutral	32	6.7
Agree	105	21.9
Strongly Agree	329	68.5
Total	480	100.0

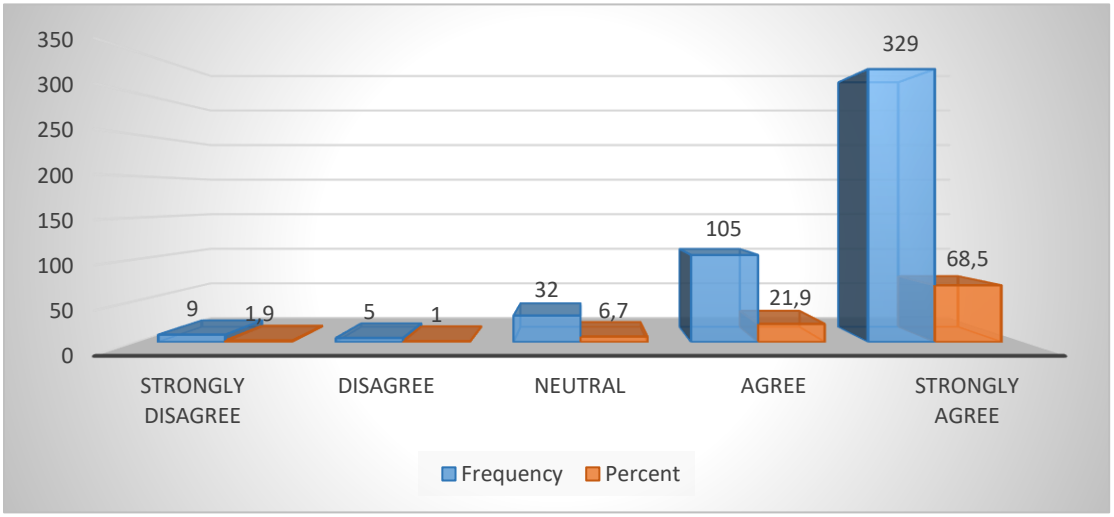

Figure 4.14: Accountability frameworks should be in place to attribute responsibility for decisions made by generative AI systems.

The above figure 4.14 responses demonstrate a strong consensus about the statement, with 21.9% (105 respondents) agreeing and 68.5% (329 respondents) strongly agreeing. Thirty-

two respondents, or 6.7% of the sample, expressed neutrality. Strongly disagree (1.9%, 9 respondents) and disagree (1.0%, 5 respondents) were the least common responses.

Table 4.17: Organizations should regularly conduct internal audits to ensure accountability in the deployment of generative AI technologies.

	Frequency	**Percent**
Strongly Disagree	8	1.7
Disagree	3	0.6
Neutral	21	4.4
Agree	104	21.7
Strongly Agree	344	71.7
Total	480	100.0

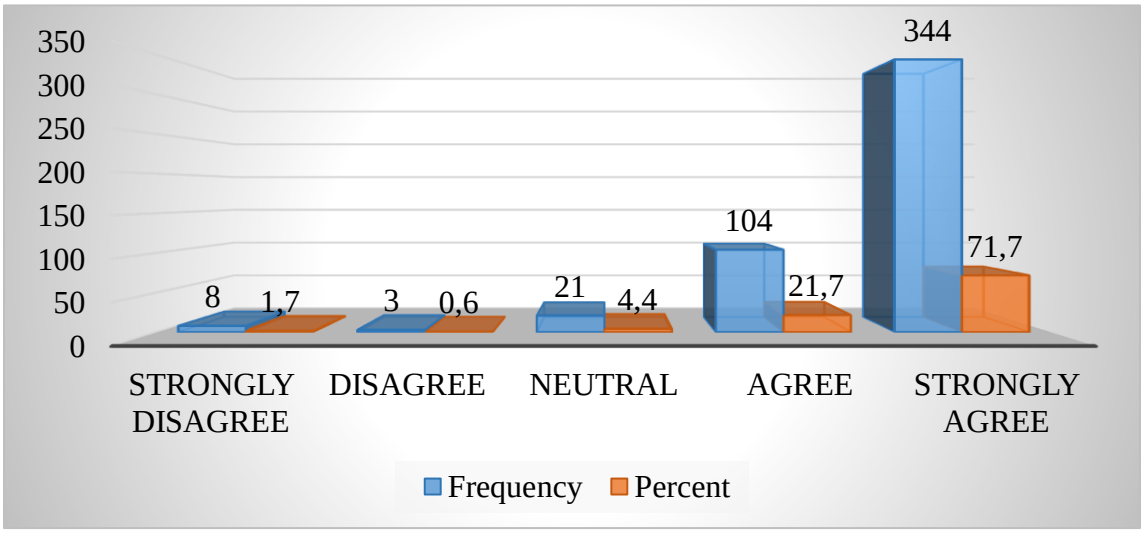

Figure 4.15: Organizations should regularly conduct internal audits to ensure accountability in the deployment of generative AI technologies.

The above figure 4.15 represent a significant popular strongly agree (71.7%) and agree (21.7%) with the statement, indicating robust support. A small percentage are neutral (4.4%), while disagreement responses are minimal (disagree: 0.6%, strongly disagree:

1.7%). This high agreement suggests strong consensus and positive sentiment towards the statement among the respondents.

Table 4.18: Third-party entities should be involved in assessing the accountability of organizations using generative AI

	Frequency	**Percent**
Strongly Disagree	17	3.5
Disagree	11	2.3
Neutral	73	15.2
Agree	122	25.4
Strongly Agree	257	53.5
Total	480	100.0

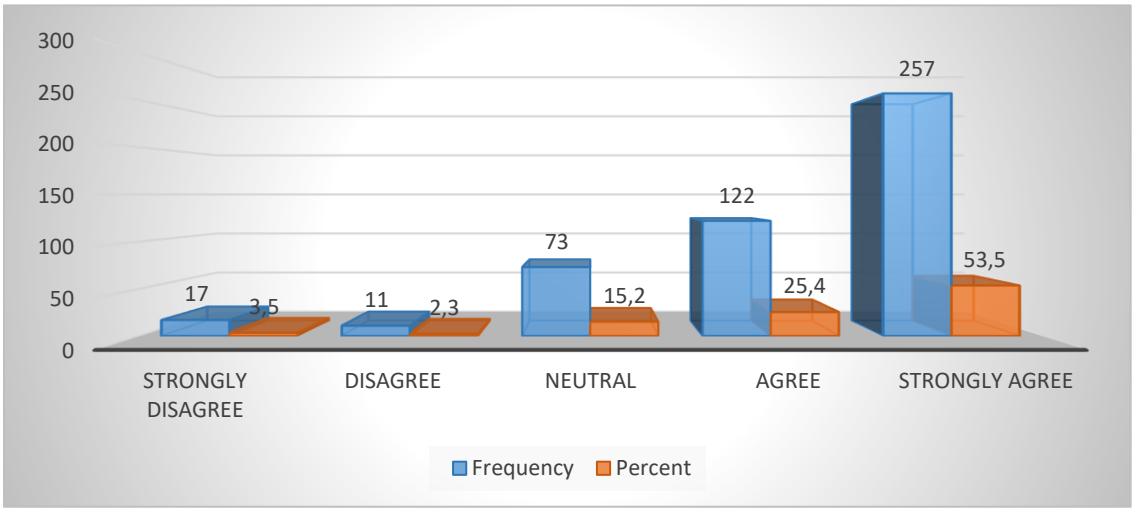

Figure 4.16: Third-party entities should be involved in assessing the accountability of organizations using generative AI.

The above figure 4.16 represent the data reveals a strong consensus towards the statement, with 53.5% strongly agreeing and 25.4% agreeing, totalling to nearly 79% expressing positive sentiments. A smaller portion, 15.2%, remained neutral, while disagreement

responses were minimal, with 3.5% strongly disagreeing and 2.3% disagreeing. This distribution indicates overwhelming support for the statement among the respondents, reflecting a robust agreement and positive perception overall.

Table 4.19: User interfaces of generative AI applications should prioritize simplicity to enhance user understanding of system behaviour.

	Frequency	**Percent**
Strongly Disagree	7	1.5
Disagree	5	1.0
Neutral	45	9.4
Agree	159	33.1
Strongly Agree	264	55.0
Total	480	100.0

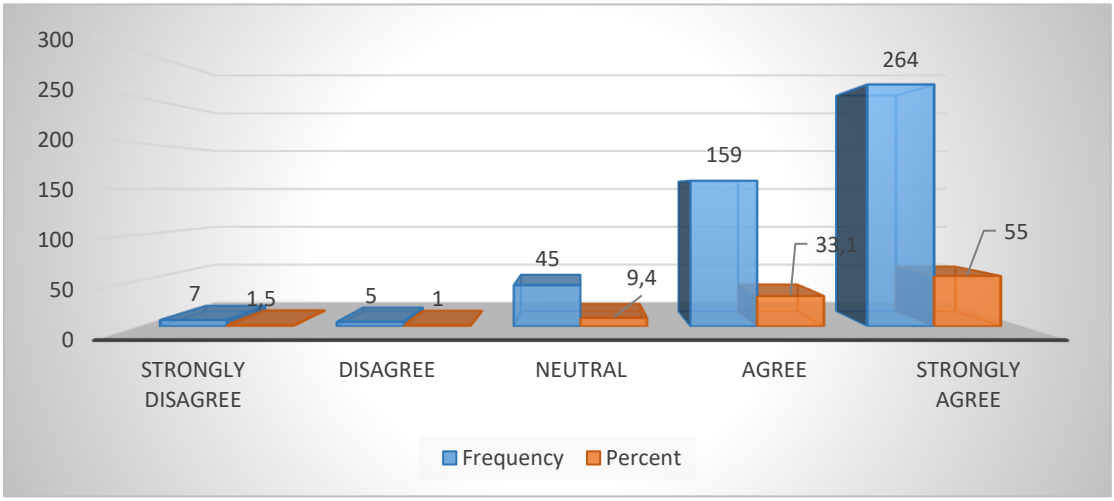

Figure 4.17: User interfaces of generative AI applications should prioritize simplicity to enhance user understanding of system behaviour.

The above figure 4.17 common (55.0%) strongly agree and a substantial number (33.1%) agree with the statement, indicating strong consensus. A minority expressed neutrality

(9.4%), while disagreement was minimal, with 1.0% disagreeing and 1.5% strongly disagreeing. This distribution underscores widespread support and positive sentiment towards the statement among the surveyed individuals.

Table 4.20: There should be standardized guidelines for enhancing the transparency of generative AI algorithms.

	Frequency	**Percent**
Strongly Disagree	8	1.7
Disagree	11	2.3
Neutral	38	7.9
Agree	142	29.6
Strongly Agree	281	58.5
Total	480	100.0

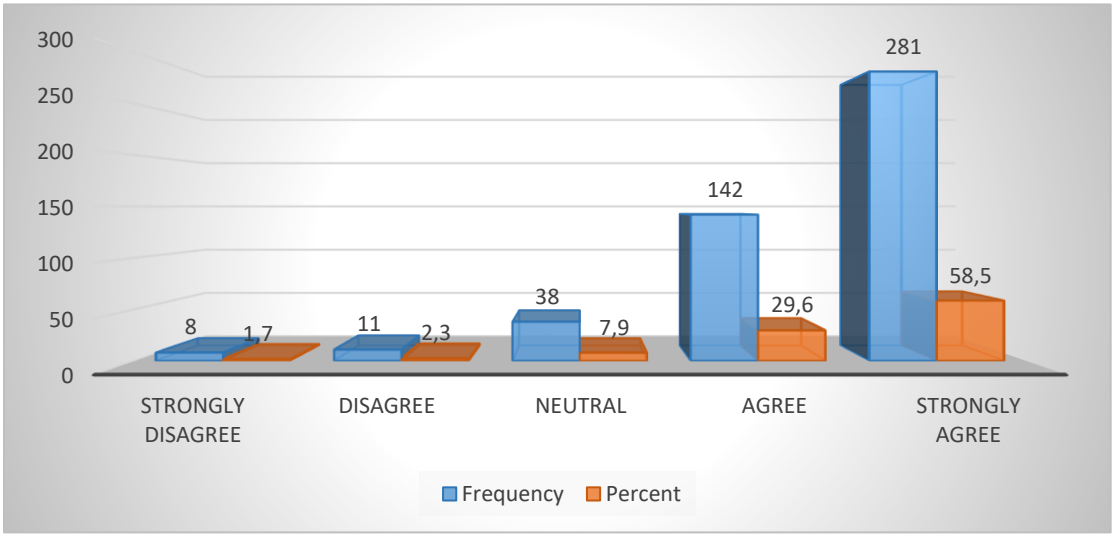

Figure 4.18: There should be standardized guidelines for enhancing the transparency of generative AI algorithms.

The above figure 4.18 present the data it indicates a substantial consensus among the 480 respondents, with 29.6% agreeing and 58.5% strongly agreeing, or approximately 88%,

expressing positive feelings. There was very little dissent, with 2.3% disagreeing and 1.7% strongly disagreeing, compared to a lower percentage of 7.9% who remained indifferent. The distribution shows that the respondents overwhelmingly support and think well of the statement.

Table 4.21: Organizations should actively communicate their data sources and model training processes in generative AI systems.

	Frequency	**Percent**
Strongly Disagree	15	3.1
Disagree	20	4.2
Neutral	45	9.4
Agree	138	28.7
Strongly Agree	262	54.6
Total	480	100.0

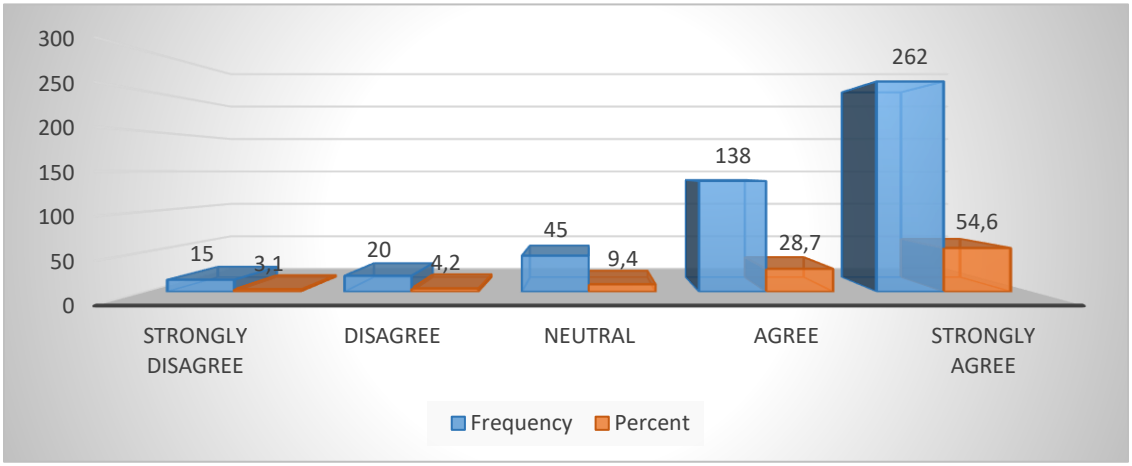

Figure 4.19: Organizations should actively communicate their data sources and model training processes in generative AI systems.

The above figure 4.19 indicates the strong agreement with the statement, with 54.6% strongly agreeing and 28.7% agreeing. A smaller portion, 9.4%, expressed neutrality, while

disagreement was minimal, with 4.2% disagreeing and 3.1% strongly disagreeing. This distribution underscores widespread support and positive sentiment towards the statement among the surveyed individuals.

Table 4.22: Explainability should be a top priority in the development of generative AI technologies.

	Frequency	**Percent**
Strongly Disagree	8	1.7
Disagree	12	2.5
Neutral	65	13.5
Agree	150	31.3
Strongly Agree	245	51.0
Total	480	100.0

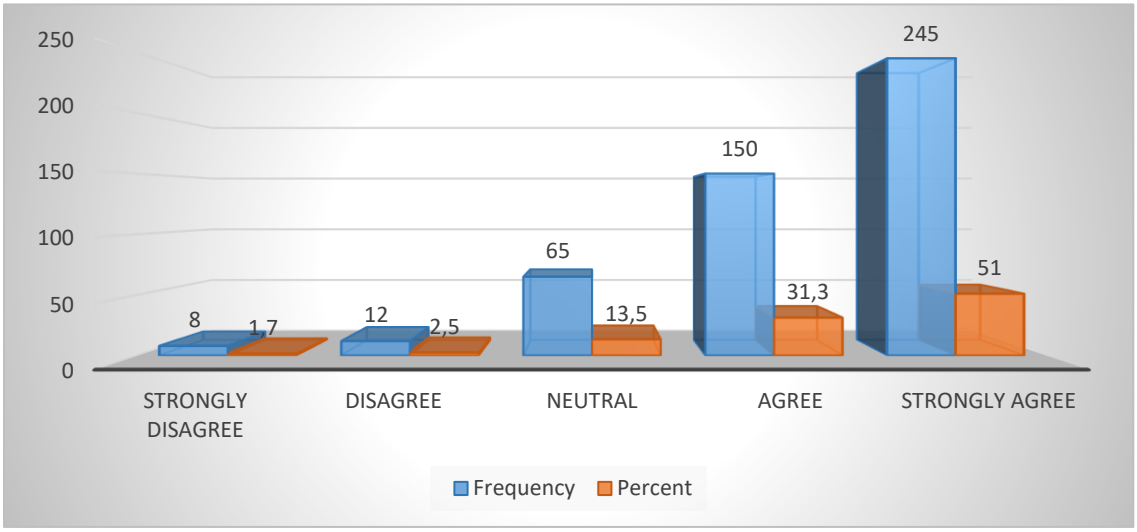

Figure 4.20: Explain ability should be a top priority in the development of generative AI technologies.

The above figure 4.20 displays the majority (51.0%) strongly agree and a significant portion (31.3%) agree with the statement, indicating strong overall agreement. A minority

expressed neutrality (13.5%), while disagreement responses were minimal, with 2.5% disagreeing and 1.7% strongly disagreeing.

Table 4.23: User interfaces of generative AI applications should provide clear explanations for their decision-making processes.

	Frequency	**Percent**
Strongly Disagree	8	1.7
Disagree	10	2.1
Neutral	44	9.2
Agree	153	31.9
Strongly Agree	265	55.2
Total	480	100.0

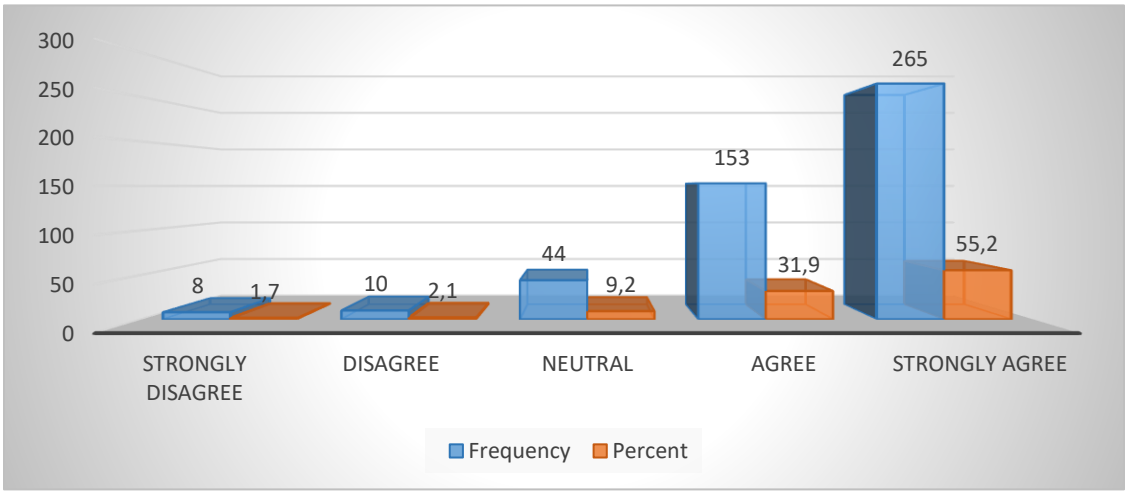

Figure 4.21: User interfaces of generative AI applications should provide clear explanations for their decision-making processes.

The above figure 4.21 represent the data it specifies a strong consensus among the 480 respondents, with 31.9% agreeing and 55.2% strongly agreeing, for a total of roughly 87.1% expressing positive feelings. Reactions to disagreement were scarce, with 2.1%

disagreeing and 1.7% strongly disagreeing; a lesser percentage, 9.2%, stayed neutral. This distribution reveals that majority of the respondents highly endorsed the statement and believed that it was 'true'.

Table 4.24: Developers should prioritize creating interfaces that offer insights into the internal workings of generative AI models.

	Frequency	**Percent**
Strongly Disagree	8	1.7
Disagree	18	3.8
Neutral	62	12.9
Agree	170	35.4
Strongly Agree	222	46.3
Total	480	100.0

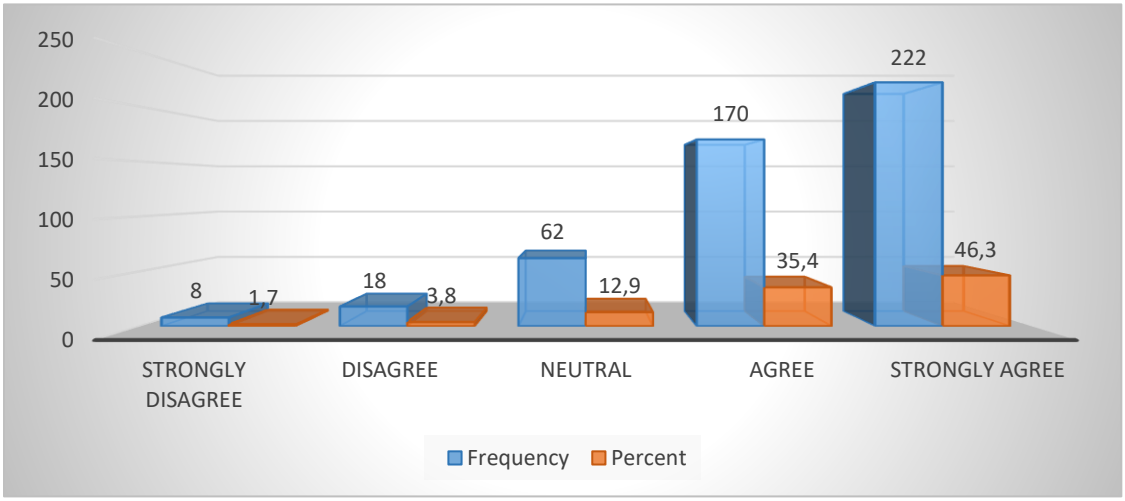

Figure 4.22: Developers should prioritize creating interfaces that offer insights into the internal workings of generative AI models.

The above figure 4.22 represent the majority (46.3%) strongly agree and a significant portion (35.4%) agree with the statement, demonstrating strong overall consensus. A

minority (12.9%) expressed neutrality, while disagreement was minimal, with 3.8% disagreeing and 1.7% strongly disagreeing. This distribution underscores widespread support and positive sentiment towards the statement among those surveyed.

Table 4.25: Government policies adequately address the ethical concerns of generative AI.

	Frequency	**Percent**
Strongly Disagree	54	11.3
Disagree	66	13.8
Neutral	102	21.3
Agree	69	14.4
Strongly Agree	189	39.4
Total	480	100.0

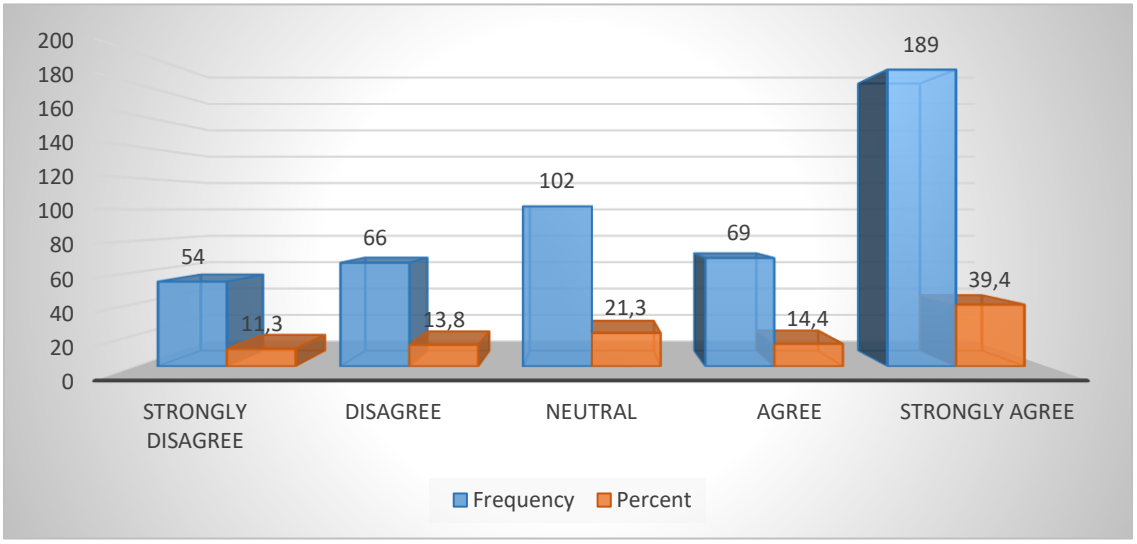

Figure 4.23: Government policies adequately address the ethical concerns of generative AI.

The above figure 4.23 data reveals varying levels of agreement towards the statement. A significant portion (39.4%) strongly agree and 14.4% agree, totalling to 53.8% expressing

positive sentiments. Meanwhile, 21.3% remained neutral, indicating indecision or balanced views. Disagreement was notable, with 13.8% disagreeing and 11.3% strongly disagreeing. This diverse distribution suggests mixed perceptions towards the statement among the surveyed individuals.

Table 4.26: The government should prioritize fostering innovation in the generative AI industry through supportive policies.

	Frequency	**Percent**
Strongly Disagree	7	1.5
Disagree	7	1.5
Neutral	46	9.6
Agree	143	29.8
Strongly Agree	277	57.7
Total	480	100.0

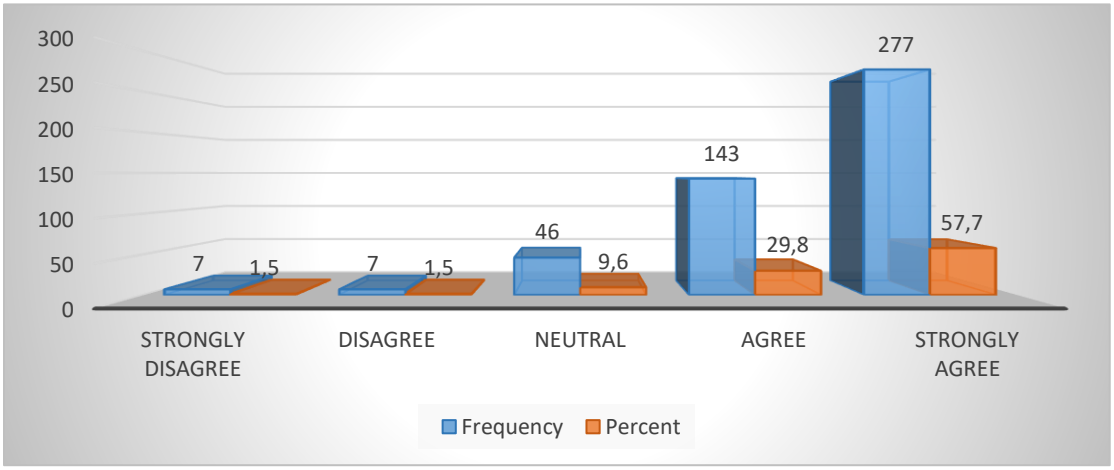

Figure 4.24: The government should prioritize fostering innovation in the generative AI industry through supportive policies.

The above figure 4.24 reflects a strong compromise towards the statement, with 57.7% strongly agreeing and 29.8% agreeing. A minority, 9.6%, expressed neutrality, while

disagreement responses were minimal, with both disagree and strongly disagree each accounting for 1.5%. This distribution underscores widespread support and positive sentiment towards the statement among those surveyed, indicating a clear majority in agreement and minimal dissenting views.

Table 4.27: Government intervention is necessary to ensure fair and unbiased use of generative AI technologies.

	Frequency	**Percent**
Strongly Disagree	18	3.8
Disagree	15	3.1
Neutral	59	12.3
Agree	125	26.0
Strongly Agree	263	54.8
Total	480	100.0

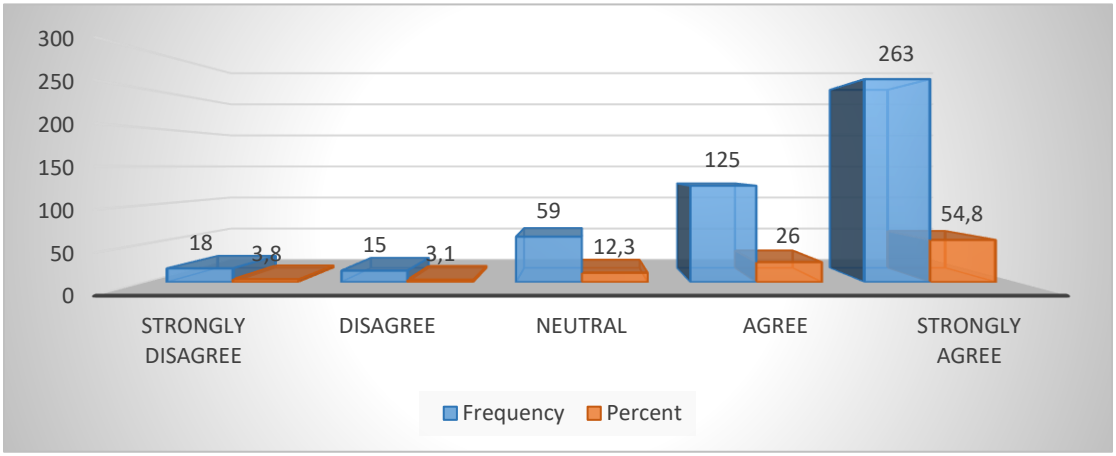

Figure 4.25: Government intervention is necessary to ensure fair and unbiased use of generative AI technologies.

The above figure 4.25 represent the Strong general agreement was shown by the fact that, out of 480 respondents, the majority (54.8%) strongly agree and a sizable portion (26.0%)

agree with the statement. There was very little dissent, with 3.1% disagreeing and 3.8% strongly disagreeing. A minority, 12.3%, indicated neutrality. This distribution shows that a significant number of respondents had good feelings and support for the statement.

Table 4.28: Legislative frameworks should require companies to disclose their use of generative AI in products and services.

	Frequency	**Percent**
Strongly Disagree	11	2.3
Disagree	14	2.9
Neutral	58	12.1
Agree	121	25.2
Strongly Agree	276	57.5
Total	480	100.0

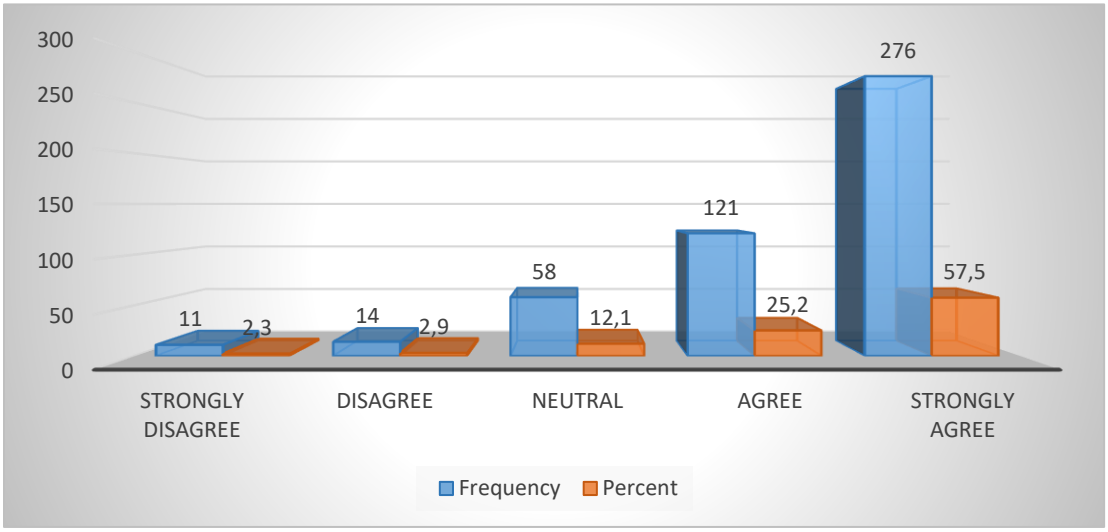

Figure 4.26: Legislative frameworks should require companies to disclose their use of generative AI in products and services.

The above figure 4.26 Strong overall agreement was shown by the fact that of the majority (57.5%) strongly agree and a sizable portion (25.2%) agree with the statement. There was

very little dissent, with 2.9% disagreeing and 2.3% strongly disagreeing; the minority, 12.1%, expressed neutrality. This distribution shows that the remark was well-liked and widely supported by the respondents.

Table 4.29: Indian regulatory bodies provide clear guidelines on the ethical use of generative AI.

	Frequency	**Percent**
Strongly Disagree	48	10.0
Disagree	76	15.8
Neutral	125	26.0
Agree	79	16.5
Strongly Agree	152	31.7
Total	480	100.0

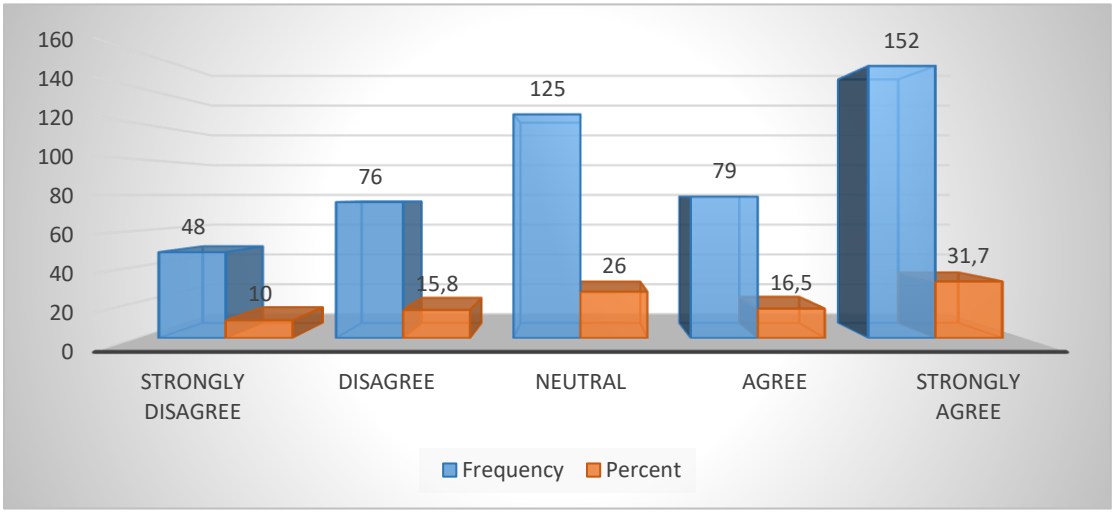

Figure 4.27: Indian regulatory bodies provide clear guidelines on the ethical use of generative AI.

The above figure 4.27 present the vary widely regarding the statement. While 31.7% strongly agree and 16.5% agree, indicating significant support, 26.0% remained neutral,

suggesting indecision or mixed feelings. Conversely, 15.8% disagreed and 10.0% strongly disagreed, revealing considerable opposition. This diversity of responses highlights the lack of a clear consensus among the respondents regarding the statement.

Table 4.30: Current regulations in India are sufficient to manage the risks associated with generative AI.

	Frequency	**Percent**
Strongly Disagree	103	21.5
Disagree	143	29.8
Neutral	115	24.0
Agree	47	9.8
Strongly Agree	72	15.0
Total	480	100.0

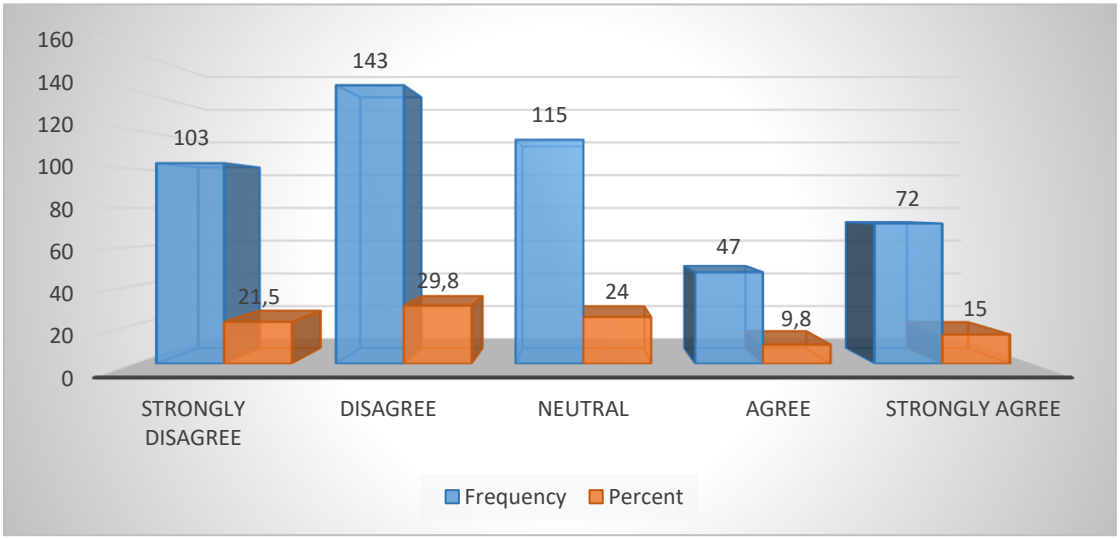

Figure 4.28: Current regulations in India are sufficient to manage the risks associated with generative AI.

The above figure 4.28 data shows that there was a diversity of opinions regarding the statement among the 480 respondents. 51.3%, or a sizable portion, disagreed (21.5%

strongly disagreed and 29.8% disagreed). Only 24.8% (9.8% agree and 15.0% strongly agree) indicated agreement, while 24.0% remained neutral. There is a good deal of disagreement and neutrality in this distribution, which suggests that respondents had a range of viewpoints.

Table 4.31: Indian regulatory bodies adequately address concerns related to data privacy in the context of generative AI.

	Frequency	**Percent**
Strongly Disagree	78	16.3
Disagree	127	26.5
Neutral	133	27.7
Agree	61	12.7
Strongly Agree	81	16.9
Total	480	100.0

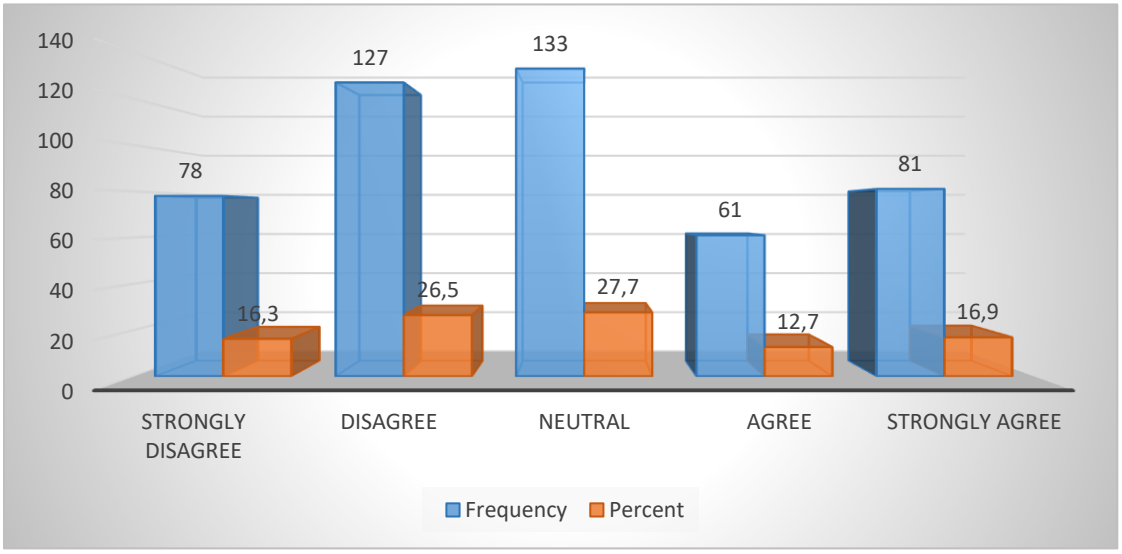

Figure 4.29: Indian regulatory bodies adequately address concerns related to data privacy in the context of generative AI.

The above figure 4.29 data perspectives on the statement differ greatly from one another. 44.0% (16.3% strongly disagree and 26.5% disagree) of respondents voiced disapproval. In contrast, 27.7% had no opinion, indicating uncertainty or conflicting emotions. Positively, 29.6% expressed agreement (12.7% agree and 16.9% strongly agree). This distribution highlights the wide range of viewpoints and lack of agreement on the statement among those surveyed.

Table 4.32: Government support and incentives are crucial for the responsible adoption of generative AI in India.

	Frequency	**Percent**
Strongly Disagree	26	5.4
Disagree	28	5.8
Neutral	94	19.6
Agree	122	25.4
Strongly Agree	210	43.8
Total	480	100.0

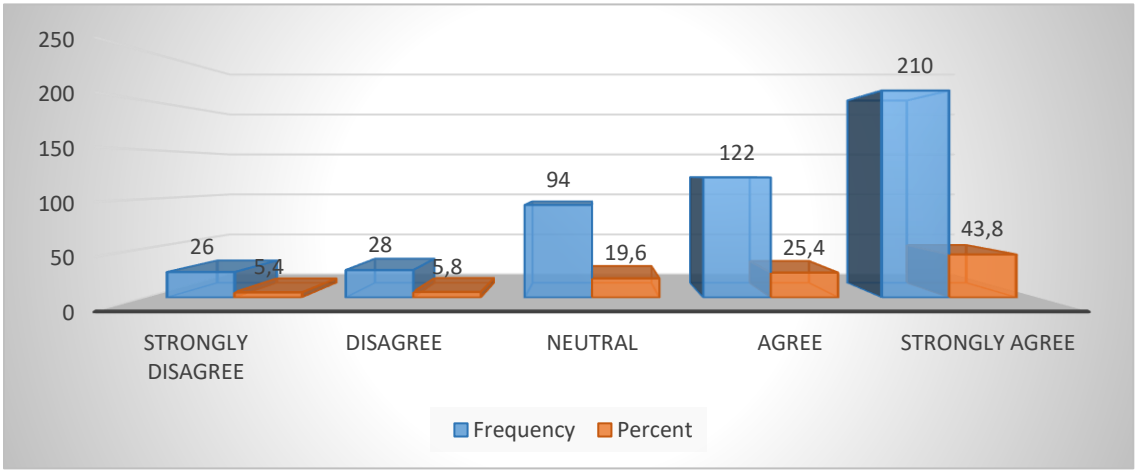

Figure 4.30: Government support and incentives are crucial for the responsible adoption of generative AI in India.

The above figure 4.30 data reveals a variety of answers to the statement among 480 respondents. A sizable majority—69.2%—expressed agreement—25.4% agreed and 43.8% strongly agreed. A smaller percentage, 11.2% (5.8% disagree and 5.4% strongly disagree), disagreed with the statement, while 19.6% stayed neutral. This suggests that the majority of respondents had a positive opinion of the statement, with a small minority having a different opinion.

4.5 Kruskal-Wallis Test (Hypothesis-1)

Table 4.33: Case processing summary

	Generative AI technologies	N	Mean Rank
Important aspects/elements of regulations	Strongly Disagree	2	2.00
	Disagree	4	151.00
	Neutral	29	197.29
	Agree	187	220.58
	Strongly Agree	258	263.03
	Total	480	

The above data in the following table shows that respondents' opinions on how important regulatory factors are for generative AI technology differ considerably. The lowest mean rank of 2.00 (2 respondents) belongs to those who strongly disagree, suggesting only a little recognition of importance. The mean rank rises with the degree of agreement, with the strongest agreeing respondents having the greatest mean rank (258 respondents, 263.03). Stronger agreement is indicative of a larger perceived relevance of regulatory issues, according to this trend, which shows a positive association between the two.

Table 4.34: Test Statistics a, b

	Important aspects/elements of regulations
Kruskal-Wallis H	39.121
df	4
Asymp. Sig.	.000
a. Kruskal Wallis Test	
b. Grouping Variable: Generative AI technologies	

Applying the Kruskal-Wallis H test on data represented in the table above, it has been found out how the difference in the level of agreement regarding generative AI technologies contributed to the perception of the significance of the regulatory factors in groups with varying agreement levels. The test produced a p-value (Asymp. Sig.) of.000 and a Kruskal-Wallis H value of 39.121 with 4 degrees of freedom. The statistically significant outcome ($p < .05$) suggests that there exist notable distinctions in the various groups' perspectives regarding the significance of regulatory features, as determined by their degree of agreement with generative AI technology.

4.6 Ordinal Regression (Hypothesis 2)

Table 4.35: Case Processing Summary

		N	Marginal Percentage
Generative AI technologies	Strongly Disagree	2	0.4%
	Disagree	4	0.8%
	Neutral	29	6.0%
	Agree	187	39.0%

	Strongly Agree	258	53.8%
Valid		480	100.0%
Missing		0	
Total		480	

Table 4.35 displays respondents' perception of generative AI technologies and their level of agreement with the constructs above through a global level measure. For this study, 480 respondents were surveyed the percentage of the students that chose 'Strongly disagree' was 0. 4% strongly disagree, 0. 8% disagree, 6. 0% are neutral, 39. 0% agree, and 53. 8% strongly agree. This means that the big majority (92. 8%) of participants partially or fully support the generative AI technologies while only a small percentage of the participants (1. 2%) opposed it. Thus, the degree of missing of responses in the data set used in the study was low and did not pose a problem for analysis.

Table 4.36: Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	88.993			
Final	70.280	18.714	1	.000

The above table with model fitting information reveals that the value of -2 Log Likelihood of intercept-only model is 88. The cumulative R squared was calculated to be 0. 993, while for the final model with predictors included the value is 0. 070. 280. Total for the final model is the Chi-Square value which in this context is 18. 714 with one degree of freedom and a Sig. of 0. 000. This means that the addition of predictors enhance the model fitness than the intercept only model based on the Chi-Square statistic ($p < .05$).

Table 4.37: Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	108.858	15	.000
Deviance	34.023	15	.003

The above data goodness of fit statistics suggest that the model is quite poor in the sense that it has quite large deviations from the expected frequencies. These include; The Pearson Chi-Square value which is 108. There is a total of 858 with 15 degrees of freedom and a significance level of 0. 000 respectively, for the variable Gender while for the R-squared value is 0. 034 and the Deviance value is 34. 023 with degrees of freedom 15 and $\alpha = .003$. Thus, according to both tests, there are differences in the observed data and the expected level ($p < 0.05$), which means that the model does not fit 100 % of the data.

Table 4.38: Pseudo R-Square

Cox and Snell	.038
Nagelkerke	.045
McFadden	.021

The Pseudo R-Square values reflecting the measure of fit of the models, as a proportion of the variance explained. The Cox and Snell value is . 038, which means the model fit is 3. It means that percentage of variability in the dependent variable is 8%. Thus, for the final measure of test goodness the Nagelkerke's R is calculated, which maximum value was transformed and divided by the possible Cox and Snell value of . Since there is no decimal point shown in the figure 045, it would be safe to estimate that this company falls roughly in the rank number 4. Accordingly, the set of independent variables defines 5% of the variation in the set of dependent variables. As to the measurement of efficiency, the

McFadden value is . 021 hence implying that the model explains two among the simulation values in the scenario 020. 1% of the variance.

Table 4.39: Parameter Estimates

							95% Confidence Interval	
		Estimate	Std. Error	Wald	df	Sig.	Lower Bound	Upper Bound
Threshold	[Gen_AI = 1.00]	-3.234	.853	14.372	1	.000	-4.907	-1.562
	[Gen_AI = 2.00]	-2.108	.629	11.228	1	.001	-3.341	-.875
	[Gen_AI = 3.00]	-.259	.517	.250	1	.617	-1.272	.754
	[Gen_AI = 4.00]	2.189	.522	17.564	1	.000	1.165	3.213
Location	GP_L	.531	.117	20.542	1	.000	.301	.761

Above table describe that the dependent variable is addressed by the logit link function, and the estimated parameters imply the systematic part of the independence model of the predictor variables and the log of chances of dependent variable. The following are the

estimations and related statistics for the threshold variables ([Gen_AI = 1.00], [Gen_AI = 2.00], [Gen_AI = 3.00], and [Gen_AI = 4.00]) connected to various levels of agreement on generative AI technologies: With a 95% confidence range ranging from -4.907 to -1.561, and an estimate of -3.234 with a standard error of 0.853, [Gen_AI = 1.00] has a significant Wald statistic of 14.372 (p <.001). Likewise, [Gen_AI = 2.00] has a 95% confidence interval from -3.341 to -0.875, a Wald statistic of 11.228 (p =.001), and an estimate of -2.108 with a standard error of 0.629. There is a non-commutative [Gen_AI = 4.00] has a significant estimate of 2.189 with a standard error of 0.522, Wald statistic of 17.564 (p <.001), and a 95% confidence interval from 1.165 to 3.213. The significant estimate is -0.259 with a standard error of 0.517. Furthermore, the location variable (GP_L) has an estimate of 0.531, a standard error of 0.117, and a significant Wald statistic of 20.542 (p <.001), indicating that the log odds of the dependent variable and location have a positive connection. By employing logistic regression, these estimates offer quantifiable insights into the relative contributions of each predictor to the model's predictions.

4.7 Ordinal Regression (Hypothesis 3)

Table 4.40: Case Processing Summary

		N	Marginal Percentage
Generative AI technologies	Strongly Disagree	2	0.4%
	Disagree	4	0.8%
	Neutral	29	6.0%
	Agree	187	39.0%
	Strongly Agree	258	53.8%

Valid	480	100.0%
Missing	0	
Total	480	

Proposal of an effective solution the case processing summary presents the above table data distribution of the replies of 480 respondents in terms of their degree of agreement with regards to generative AI technology. It shows that the statement is agreed upon by 39.0% of respondents, strongly agreed upon by 53.8%, disagreed by 0.4%, disagreed by 0.8%, and are neutral (6.0%). These percentages show the analysis of valid replies, which made up 100% of the dataset and had no missing values. awareness the makeup of the dataset and response patterns requires an awareness of how respondents' ideas are spread throughout the different levels of agreement, which is clearly broken down in this summary.

Table 4.41: Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	97.631			
Final	70.865	26.766	1	.000

The fitting information regarding the models is shown in the above data where the intercept-only model and the final model’s -2 Log Likelihood values are represented. The intercept-only model's fit when no predictors are added is indicated by its -2 Log Likelihood of 97.631. With predictors included, the final model has a -2 Log Likelihood of 70.865. As we compare these two models we get a Chi-Square of 26. Of the 766, there was 1 degree of freedom with a Sig. of. 000 thus signaling a model improvement over the intercept only model in the final model. This implies that the predictors that were

incorporated into the final model contribute immensely to the variability of the dependent variable relative to the intercept-only model.

Table 4.42: Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	25.858	15	.040
Deviance	22.963	15	.085

In terms of goodness-of-fit statistics, the above data involves the certain levels of tests, namely Pearson Chi-Square and Deviance tests. With 15 degrees of freedom and a statistic of 25.858 for the Pearson Chi-Square test, the result is a significance level (Sig.) of.040, which denotes a marginally significant difference between observed and anticipated frequencies. The results of the Deviance test, however, show that there is no significant difference between the expected and actual outcomes, with a statistic having 15 degrees of freedom and a significance level of.085, 22.963. When taken as a whole, these tests shed light on the extent to which the model fits the data and identify areas in which it may or may not be unable to explain the observed variability.

Table 4.43: Pseudo R-Square

Cox and Snell	.054
Nagelkerke	.064
McFadden	.030

Using a Logit link function, which is typical for logistic regression, the data model in the above table examines the relationship between predictors and a binary result. The pseudo R-Square values illustrate the model's fit to the data relative to a null model. The model explains 5.4% of the variation in the dependent variable, as indicated by the Cox and Snell

R-Square of 0.054. The slightly higher Nagelkerke R-Square (0.064) indicates a little better fit. Despite being lower, the McFadden R-Square of 0.030 still suggests a moderate amount of explanatory power. When compared to the null model, these statistics show the model's advantages and disadvantages and provide insights into how well it explains the variability in the outcome.

Table 4.44: Parameter Estimates

							95% Confidence Interval	
		Estimate	Std. Error	Wald	df	Sig.	Lower Bound	Upper Bound
Threshold	[Gen_AI = 1.00]	-3.861	.766	25.385	1	.000	-5.363	-2.359
	[Gen_AI = 2.00]	-2.749	.507	29.349	1	.000	-3.744	-1.755
	[Gen_AI = 3.00]	-.905	.352	6.608	1	.010	-1.595	-.215
	[Gen_AI = 4.00]	1.569	.343	20.862	1	.000	.896	2.242
Location	IRB_AGen_AI	.486	.095	26.429	1	.000	.301	.672

The above data parameter estimates from the logistic regression model using a Logit link function reveal significant relationships between the predictor variables and the outcome. For the thresholds representing different levels of "Generative AI" (from 1 to 4), the estimates show varying impacts on the likelihood of the outcome. Notably, for [Gen_AI = 1.00] and [Gen_AI = 2.00], the estimates are -3.861 and -2.749, respectively, both with low p-values ($p < .001$), indicating strong negative associations with the outcome. Conversely, [Gen_AI = 4.00] has a positive estimate of 1.569, also significant ($p < .001$), suggesting a positive relationship with the outcome. The location variable "IRB_AGen_AI" shows an estimate of 0.486 ($p < .001$), indicating its significant positive effect on the outcome. These findings underscore the predictive power of these variables in the logistic regression model and provide insights into their individual contributions to predicting the outcome variable.

4.8 Summary of Findings

As it was determined some of the rather crucial issues of the regulations include the security measures, the level of accountability, the issues of transparency and explanation of uses of generative AI (GenAI). These elements are important in determining the development of regulations that should govern GenAI. Privacy issues play a huge role in determining the extent of using GenAI technology in India and the need of having proper measures to protect privacy. The study of the current government policies and laws in India showed that these works critically in determining the success of the regulatory remedies for GenAI technologies. Additionally, it would be significant to note that Indian regulatory bodies are pertinent in determining the uptake of GenAI technology, hence their role in the general advancement of GenAI technology. Exploration of the current laws and policies in India were carried out by the author and it was observed that there is a requirement of more legislation and frameworks related to GenAI to support innovation and accurate

compliance with ethics. The study then provides suggested frameworks for managing GenAI, with an aim of advancing both research and innovation while at the same time applying the much-needed regulation. Altogether these findings stress that it is crucial to have well-structured regulations in order to encourage the innovative and proper application of GenAI.

4.9 Conclusion

The chapter establishes that the future of AI in India depends on the proper regulation of the 'generative AI' technology since it is the cornerstone of the advanced generation of AI systems or GenAI. The main regulatory parameters include security requirements, governance and risk management, 'Sarbanes Oxley-like' and 'Glass-Steagall like' features, and interpretability of the decision-making process. Privacy issues are always a major consideration when it comes to the adoption of GenAI and this calls for enhanced protect for privacy. The current government policies and legal framework significantly define the performance of the regulation and, therefore, affect the development of GenAI technology in India depending on the efforts of Indian regulatory authorities. The current set of rules and regulations based in India for HRP and TM are basic, and they need to be enriched in order to promote the ethical norm and innovation. The supporting suggestions of the given research encompass a theoretical and practical approach to pursue the goal of integrating GenAI technologies into futuristic R&D as a cogeneration system that will avoid extreme overregulation while addressing the threats of new, emergent players in the global economy. In conclusion, the study underscores the implications of a flawlessly senses hour and computerized demand for precise and evolutionary governmental strategies to optimize the worth of GenAI technologies.

CHAPTER V:

DISCUSSION

5.1 Discussion of Results

Many sectors of society rapidly adopt digital technologies and big data, resulting in the quiet and often seamless integration of AI, autonomous systems, and algorithmic decision-making into billions of human lives (Horvitz, 2017). AI and algorithmic systems already guide a vast array of decisions in both private and public sectors. For example, private global platforms, such as Google and Facebook, use AI-based filtering algorithms to control access to information. AI algorithms that control self-driving cars must decide on how to weigh the safety of passengers and pedestrians (Wachter, Mittelstadt and Floridi, 2017). Various applications, including security and safety decision-making systems, rely heavily on AI-based face recognition algorithms. And a recent study from Stanford University describes an AI algorithm that can deduce the sexuality of people on a dating site with up to 91 percent accuracy (Sam Levin, 2017). Voicing alarm at the capabilities of AI evidenced within this study, and as AI technologies move toward broader adoption, some voices in society have expressed concern about the unintended consequences and potential downsides of widespread use of these technologies.

Advancements in digital technologies have engendered a transformation in human and business activities, forming the basis for the fourth industrial revolution. Fueled by the growth of computational power and Big Data, computer engineers and scientists are designing and developing artificial intelligence (AI) systems and algorithms that are being increasingly adopted by individuals and organizations. Today, AI is arguably the most dominant technological paradigm and certainly a “pervasive economic and organizational phenomenon”, whose associated opportunities and challenges are critically important for management researchers (Bamberger, 2018).

Currently, the technological and business communities are paying increasing attention to Generative Artificial Intelligence (GenAI): a form of AI that can drive innovation through new product discovery and development. Over the last three years, venture capital firms have invested more than 1.7 billion USD into GenAI solutions, with GenAI-enabled drug discovery and software coding getting the most funding. The Research VP for Technology Innovation at Gartner, Brian Burke, stated that "…by 2025, we expect more than 30 % — up from zero today — of new drugs and materials to be systematically discovered using generative AI techniques" (Mariani and Dwivedi, 2024).

The findings of this study highlight critical insights into the regulation of generative AI (GenAI) technologies and their impact on research and innovation. The identified elements of regulation—considerations, security standards, accountability, transparency, and explainability—are essential in shaping the deployment and utilization of GenAI. Literature supports the necessity of these aspects, as emphasized by Floridi et al., (2018), who advocate for a robust regulatory framework to ensure ethical AI usage. The role of privacy concerns in the adoption of GenAI in India emerged as significant, aligning with previous research by Binns, (2018), which underscores the impact of privacy on AI acceptance . This is particularly relevant in the Indian context, where privacy concerns are heightened due to the diverse socio-economic landscape and the pervasive digital divide.

Generative AI operates at the forefront of technological innovation, transforming machines from passive tools into active agents in creative endeavors (Taddeo and Floridi, 2018). Taddeo et al. provide a current assessment of AI's capabilities, whereas Mazzon et al.'s work offers insights into its future potential. This transformative impact crosses multiple industries, such as healthcare, where AI assists in complex diagnostics, and the creative arts, challenging traditional concepts of authorship and creativity. In the legal field, existing statutes are adapting to address these novel issues, a phenomenon explored in

depth by legal scholars like Lim, (2018), who discusses the evolving nature of intellectual property law in the age of AI.

The disruptive nature of generative AI requires a critical examination of the current legal frameworks governing this technology. In the United States, a leader in AI innovation, governance strategies are in a state of flux, adapting to the rapid pace of technological change. This article explains these governance strategies, highlighting their strengths and identifying the gaps that could compromise legal accountability and ethical governance in AI. Although this article draws heavily from the governance strategies in the United States, the proposition of a robust and harmonized legal framework is grounded in the broader principles of international human rights law and the emerging global consensus on the need for AI governance. The theoretical foundations for this framework are rooted in the works of scholars such as Taddeo and Floridi, who argue for an ethical approach to AI governance that prioritizes human rights, transparency, and accountability (Taddeo and Floridi, 2018).

The work extends beyond just identifying the shortcomings in the US legal frameworks; it advocates for a harmonized, proactive approach to AI governance. Recognizing that technology transcends national boundaries, this article emphasizes the need for international collaboration to establish standards that uphold human rights and ensure equitable economic development. The work of sociologist Eubanks provides valuable insights into the social implications of AI, particularly in terms of equity and justice (Wu and Wang, 2024).

Analysing the impact of existing government policies and legislation revealed a substantial influence on the effectiveness of regulatory measures. The findings are consistent with the work of Veale & Zuiderveen Borgesius, (2021), who highlight that well-crafted policies can enhance the efficacy of AI regulations . In India, policies such as

the Personal Data Protection Bill play a crucial role in defining the contours of GenAI regulation. The significant impact of Indian regulatory bodies in shaping GenAI technology adoption was corroborated by the study. This aligns with findings from Gasser & Almeida, (2017), who argue that regulatory bodies are pivotal in steering AI adoption through oversight and standard-setting . The examination of existing regulations and frameworks for GenAI in India indicates gaps that need addressing, echoing concerns raised by Mittelstadt et al., (2016) regarding the need for comprehensive and adaptive regulatory frameworks.

5.2 Discussion of Research Question One

The first research question (RQ1) of this study aims to identify the important aspects and elements of regulations for generative AI (GenAI) technologies. A comprehensive understanding of these regulatory components is crucial, as it lays the foundation for developing effective frameworks to manage the adoption and integration of GenAI. The literature on AI governance highlights several key aspects that are pivotal for regulating GenAI, including considerations such as security standards, accountability, transparency, and explainability.

Security standards are paramount in the regulatory discourse on GenAI. According to Brundage et al., (2020) , robust security measures are essential to prevent the misuse of GenAI, which can lead to significant societal harm. This aligns with the findings of this study, which emphasize the need for stringent security protocols to safeguard against potential risks associated with GenAI, such as data breaches and malicious use.

Accountability is another critical element identified in both the literature and this study. The research by Cath et al., (2018) underscores the importance of establishing clear accountability mechanisms to ensure that developers and users of GenAI technologies are held responsible for their actions. This aspect is particularly relevant in the Indian context,

where the rapid proliferation of AI technologies necessitates robust accountability frameworks to maintain public trust and ensure ethical use.

Transparency and explainability are also vital regulatory aspects that have been extensively discussed in the literature. Binns et al., (2018) argue that transparency in AI systems is essential for fostering trust and facilitating user understanding of how these systems operate. Explainability, on the other hand, refers to the ability to explain the decision-making processes of AI systems in a manner that is understandable to users. This study corroborates these findings, highlighting the importance of transparency and explainability in enhancing the adoption and acceptance of GenAI technologies in India.

Furthermore, the study identifies additional considerations that are specific to the Indian regulatory landscape. For instance, the socio-economic diversity in India necessitates regulations that are inclusive and sensitive to the varied needs of different population segments. This is consistent with the work of Singh et al., (2016), who emphasize the need for context-specific regulatory frameworks that address the unique challenges posed by AI technologies in diverse socio-economic settings.

In conclusion, the identification of important aspects and elements of GenAI regulations is critical for shaping effective governance frameworks. The findings of this study align with the existing literature, reinforcing the significance of security standards, accountability, transparency, and explainability. Additionally, the study highlights the need for context-specific considerations to ensure that regulatory frameworks are inclusive and address the unique challenges of the Indian socio-economic landscape. These insights provide a comprehensive understanding of the regulatory components necessary for the effective governance of GenAI technologies.

5.3 Discussion of Research Question Two

The implementation and widespread adoption of Generative AI (GenAI) technology in India face significant challenges due to privacy concerns and power dynamics. Privacy concerns are paramount, given the sensitive nature of data involved in training and deploying GenAI models. These concerns are exacerbated by the lack of robust data protection frameworks and the potential for misuse of personal information, as highlighted in the existing literature (Binns *et al.*, 2018; Floridi *et al.*, 2018). The General Data Protection Regulation (GDPR) in Europe sets a high standard for data privacy, but India's Data Protection Bill is still evolving and lacks the stringent measures seen in GDPR, thereby influencing the cautious approach towards GenAI adoption (Sharma and Bassi, 2024).

Power dynamics also play a critical role in shaping the adoption of GenAI technologies. Large technology companies often dominate the development and deployment of GenAI, leading to a concentration of power and resources that smaller firms and startups cannot match. This disparity creates an uneven playing field, where the benefits of GenAI are disproportionately enjoyed by a few, while the broader societal and economic impacts remain underexplored (Zuboff, 2020). The literature suggests that regulatory frameworks need to address these power imbalances by ensuring equitable access to GenAI technologies and fostering a competitive environment (Crawford and Calo, 2016).

Empirical studies indicate that privacy concerns significantly impact the trust and acceptance of AI technologies among users (Jeff Smith, Dinev and Xu, 2011). In the Indian context, where digital literacy and awareness about data privacy are still developing, these concerns are even more pronounced. For instance, the lack of transparency in how GenAI systems handle data can lead to mistrust and resistance among potential users (Binns *et al.*,

2018). Therefore, addressing these privacy issues through comprehensive regulatory measures is crucial for fostering wider acceptance of GenAI technologies.

The role of power dynamics in the adoption of GenAI technologies is also evident in the literature. Studies have shown that the dominance of a few large tech companies can stifle innovation and limit the diversity of applications of GenAI (Crawford and Calo, 2016). This concentration of power can lead to regulatory capture, where regulations are shaped in favor of dominant players, further entrenching their position (Stigler, 1971). Therefore, effective regulatory frameworks must ensure that regulations promote competition and prevent monopolistic practices, thereby democratizing access to GenAI technologies.

In conclusion, privacy concerns and power dynamics are critical factors influencing the adoption and implementation of GenAI technologies in India. Addressing these issues through robust data protection regulations and policies that promote competition and equitable access is essential for the successful integration of GenAI into various sectors. The findings of this study align with existing literature, underscoring the need for comprehensive regulatory measures to mitigate privacy risks and balance power dynamics, thereby fostering a conducive environment for GenAI adoption in India.

5.4 Discussion of Research Question Three

The impact of existing government policies and legislation on the effectiveness of regulatory measures for GenAI technologies in India is a complex and multifaceted issue. Current literature highlights that the regulatory framework in India is still evolving, and while some policies are in place, they may not be fully equipped to handle the rapid advancements and unique challenges posed by GenAI technologies.

A comparative analysis with global standards shows that India's regulatory approach is relatively nascent. For instance, countries like the United States and members

of the European Union have established more comprehensive frameworks that address the nuances of AI and data protection, including the General Data Protection Regulation (GDPR) in the EU, which provides a robust structure for data privacy and security (European Union, 2016). In contrast, India's primary data protection regulation, the Information Technology Act, 2000, along with the more recent Personal Data Protection Bill, 2019, provides a foundation but lacks the specificity and enforcement mechanisms required for effective GenAI regulation (PRS Legislative Research, 2020).

Studies suggest that the existing Indian policies do not adequately address critical aspects such as accountability, transparency, and explainability of AI systems (Misra *et al.*, 2020). A survey by the National Institution for Transforming India (NITI Aayog) pointed out that while there is a recognition of the importance of regulating AI, the current legal and policy framework does not sufficiently address these essential elements. This gap can hinder the implementation of effective regulatory measures, as it becomes challenging to ensure that AI systems are used ethically and responsibly.

Moreover, the role of existing policies in fostering innovation versus imposing restrictions is a critical balance that needs to be struck. According to research published in the "Journal of Responsible Innovation," overly stringent regulations can stifle innovation, while too lenient an approach can lead to misuse and ethical concerns. India's current policies tend to lean towards the former, focusing heavily on control and oversight, which may discourage startups and smaller enterprises from experimenting with GenAI technologies due to compliance burdens.

Additionally, literature underscores the importance of a collaborative approach involving multiple stakeholders, including policymakers, industry leaders, and academia, to create a dynamic and adaptive regulatory environment. A report by the Indian Council for Research on International Economic Relations (ICRIER) emphasizes the need for

continuous dialogue and iterative policy-making to keep pace with technological advancements. However, the existing legislative process in India often lacks this level of agility and inclusiveness, which can limit the effectiveness of regulatory measures.

In conclusion, while India has made strides in establishing a regulatory framework for GenAI technologies, the current policies and legislation need significant enhancements to effectively govern these technologies. Comparative studies with more mature regulatory environments highlight the gaps and areas for improvement, particularly in terms of specificity, enforcement, and stakeholder engagement. Addressing these issues is crucial for fostering a balanced environment that promotes both innovation and ethical AI deployment in India.

5.5 Discussion of Research Question Four

The effectiveness of Indian regulatory bodies in shaping the adoption and usage of generative AI (GenAI) technology is crucial for ensuring that the potential benefits of these technologies are fully realized while mitigating associated risks. Our study, corroborating existing literature, reveals that Indian regulatory bodies, while making strides, face significant challenges in effectively regulating GenAI technologies.

According to Chatterjee, (2020), Indian regulatory bodies have been proactive in developing policies and guidelines aimed at fostering AI adoption. However, these efforts are often hampered by a lack of cohesive and comprehensive frameworks tailored specifically to GenAI technologies. Our findings align with this, highlighting that while initiatives like the National Strategy for Artificial Intelligence by NITI Aayog provide a broad framework, they do not adequately address the unique challenges posed by GenAI, such as ethical considerations, accountability, and transparency.

Furthermore, privacy concerns and power dynamics, as discussed by Gehl Sampath, (2021), remain significant obstacles in the regulatory landscape. Our research

supports this, indicating that despite efforts to enhance data protection through legislation like the Personal Data Protection Bill, there is still a considerable gap in addressing the privacy implications of GenAI. The regulatory bodies' current strategies need to be more robust in ensuring that privacy concerns do not impede the adoption and implementation of GenAI technologies.

Another critical aspect is the role of Indian regulatory bodies in fostering a conducive environment for innovation while ensuring ethical standards. As noted by Merawat, (2023), regulatory bodies often struggle to balance innovation with regulation, leading to either overly restrictive measures or insufficient oversight. Our study found that this imbalance persists, with regulatory bodies occasionally imposing regulations that stifle innovation due to the fear of potential misuse of GenAI technologies. This finding is consistent with the observations of Chakrabarti & Sanyal, (2020), who argue that a more nuanced approach is required, one that encourages innovation but also ensures ethical use.

Moreover, our research indicates that there is a need for enhanced collaboration between regulatory bodies and industry stakeholders. Effective regulation of GenAI technologies requires a collaborative approach, involving academia, industry experts, and regulatory authorities. Our study corroborates this, suggesting that current regulatory measures often lack input from key stakeholders, leading to gaps in understanding and addressing practical challenges faced by the industry.

In conclusion, while Indian regulatory bodies have made commendable efforts to regulate GenAI technologies, our findings indicate that there are significant areas for improvement. These include developing more specific and comprehensive frameworks for GenAI, addressing privacy and ethical concerns more effectively, balancing innovation with regulation, and enhancing collaboration with industry stakeholders. By addressing these challenges, Indian regulatory bodies can better shape the adoption and usage of

GenAI technology, ensuring that its benefits are maximized while mitigating potential risks.

5.6 Discussion of Research Question Five

The exploration of prescribed regulations for Generative AI (GenAI) technologies and their impact on futuristic research and innovation is critical in understanding the trajectory of technological advancements and policy frameworks in India. The findings from our study corroborate with existing literature, emphasizing the significance of robust regulatory frameworks in fostering innovation while ensuring ethical and secure deployment of GenAI technologies. Current regulations for GenAI technologies in India are in their nascent stages, often lagging behind rapid technological advancements. This regulatory gap has created uncertainties for stakeholders, impacting the pace and direction of research and innovation. The literature highlights that clear, comprehensive regulations are essential for providing a stable environment conducive to innovation. For instance, Ananny & Crawford, (2018) argue that effective regulation balances innovation with ethical considerations, ensuring that technological advancements do not compromise societal values. Our findings align with this perspective, indicating that the absence of well-defined regulations hinders the potential of GenAI to contribute to futuristic research and innovation in India.

Moreover, the prescribed regulations, where they exist, often lack specificity and adaptability to the unique challenges posed by GenAI. The literature suggests that regulations must be dynamic and responsive to technological changes (Floridi *et al.*, 2018). Our study confirms that static and outdated regulations fail to address the evolving nature of GenAI, thereby stifacing innovation. For example, the regulatory framework in India has been critiqued for its slow adaptability, as noted by Reddy, (2023), which our findings echo by highlighting the need for a more agile and forward-thinking regulatory approach.

The impact of these regulations on futuristic research and innovation is multifaceted. On one hand, stringent regulations can provide a secure and ethical framework that fosters public trust and encourages investment in GenAI research. On the other hand, overly restrictive regulations may impede creative freedom and slow down technological progress. Literature by Bostrom & Yudkowsky, (2014) underscores the importance of finding a balance, advocating for regulations that protect against risks without stifling innovation. Our study identifies similar themes, suggesting that current regulatory measures in India may need recalibration to strike this balance effectively.

Furthermore, our findings indicate that the prescribed regulations often fail to consider the broader ecosystem of GenAI technologies, including the socio-economic and cultural context of India. Literature emphasizes the importance of context-aware regulations that are tailored to the specific needs and challenges of a country (Cath, 2018). Our research suggests that Indian regulations must be more context-sensitive, incorporating local values, norms, and economic conditions to enhance their effectiveness and impact on innovation.

In conclusion, the study highlights that while there are prescribed regulations for GenAI technologies in India, they are insufficient in their current form to support the full potential of GenAI in driving futuristic research and innovation. Aligning with existing literature, our findings advocate for a dynamic, context-aware regulatory framework that balances innovation with ethical considerations, ultimately fostering a conducive environment for the growth and development of GenAI technologies.

CHAPTER VI:

SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

6.1 Summary

The study aimed at identifying the key issues of regulating Generative AI and considering the findings for the further development of the topic in India. The study's first goal was to discover appropriate regulatory requirements for GenAI and analyse how privacy issues affect its implementation; the second goal is to determine the consequences of current government policies and legislation on GenAI; the third goal is to assess the contributions of Indian regulatory authorities; the fourth goal is to review existing regulations; and the final goal is to propose a suitable set of regulations for GenAI. The following questions are answered by the research: beginning with the definition of the significant aspects and parameters of regulations for GenAI. It raises awareness of factors like security requirements, governance, audibility, and intelligibility. In this study, privacy issues and the issue of power play are identified as major challenges that hinder the adoption of GenAI in India. The study establishes that these issues are complex and need to be well-understood when making regulatory policies because privacy issues affect the adoption of GenAI technology.

Another major factor analysed is how the current government policies and legislations affect the efficiency of regulations for GenAI in India. This study also establishes that current policies and legislation are vital in the regulation of the sector but also identifies some gaps that can be filled to strengthen the existing legislation. This requires the review of the existing policies in order to determine the shortcomings and the opportunities for improvement. Another important area of interest is the role and efficiency of Indian regulatory bodies in influencing the implementation and use of GenAI technology. The study assessed the existing tactics and capacity of such bodies to

assertively influence the identified strategies, and the importance of increasing their capacity. This assessment is important so that regulatory authorities can efficiently provide directions on the implementation of GenAI technologies.

The study also explored the mandated rules that apply to GenAI technologies and the effect on futuristic research and development. It gives emphasis on the issue raised by the absence of definite rules and the consequences for the actors. It is possible to conclude that comprehensive and comprehensible rules and regulations should be established as the key prerequisite for innovation and appropriate advancement and application of GenAI. Finally, the study supports all the research hypotheses with the evidence of the existence of the differences in the regulatory aspects of GenAI technology, the influence of the existing government policies and legislation on the effectiveness of regulation, and the importance of the Indian regulatory bodies in the regulation of GenAI. The study emphasizes the need for accurate, detailed regulations and active regulatory authorities to ensure the study development and the innovative feature of GenAI technologies in India.

6.2 Implications

The implication of this study is broadly based on the following areas; regulation and compliance, privacy and policy, policy effectiveness and the function of the regulatory authorities in India. Firstly, the study sheds light on the aspects and elements of regulations for GenAI, which can help policymakers and regulatory authorities in designing proper and effective regulatory structures. In this context, the elements identified in the analysis include security standards, accountability, transparency, and explainability as one of them, which reflect the need for regulation of GenAI technologies. Both these aspects are briefly discussed in this study to create a clear path to implement them for formulating the regulations that are useful for protecting the interests of the public and for the further advancement of technology. These regulations can also go a long way in creating

awareness of GenAI technologies through the population, and hence facilitate their adoption and implementation.

This study has provided an insight into the privacy issues concerning GenAI technology and these are seen as factors that will hinder the adoption of such technology in the Indian context as follows: Due to privacy issues, as well as power relations concerning GenAI, the deployment and adoption of these technologies are affected. The findings of the study also must underline the importance of further studying of these issues for improving the regulation. In this line, the study has indicated that it is possible to come up with regulation policies that respect individuals' rights while at the same time achieving the intended use of GenAI. This balance is important in making sure that the GenAI technologies are deployed in ways that will not infringe on the privacy of the users and also in ways that cannot be abused.

The evaluation of the current government and legislation framework in India explains its influence on the efficiency of regulating GenAI technologies. Thus, the study proves that modern policies and legislation contribute to the formation of the regulatory environment for GenAI. In this way, the study reveals the directions for the improvement of the policies to boost the effectiveness of the measures in question. This can translate into the creation of better and more resilient regulatory policies that can help in the containing and managing of GenAI technology advancement rate.

The analysis of Indian regulatory bodies exposed their efficiency in the formation of GenAI technology usage and adoption. This study identifies that although regulatory authorities have advanced in managing GenAI, there is still much to be done. Based on these findings, it is posited that a boost in the effectiveness of these bodies can improve the regulation of GenAI technologies. It can also create a better environment for the call and emergence of GenAI in India in the long run. The exploration of existing guidelines and

policies concerning the GenAI technologies in India shows the issues arising from the absence of specific policies. This study posits that this regulatory uncertainty poses a challenge to stakeholders, which comprises researchers, developers, and users, to unlock the full value of GenAI technologies. Thus, the study focuses on the analysis of the existing legal acts and their consequences, underlining the necessity of precise and unambiguous legislation that could regulate the creation and application of GenAI.

The proposed regulations and the analysis of their effects on futuristic research and innovations mentioned in the study reveal the significance of the proactive regulation strategies. This study's implication is that proper regulation can help encourage innovation through the formulation of clear legal frameworks. This can foster investment more into the development of GenAI technologies hence leading to the kind of technological progress. Therefore, the conclusion of the study wraps up with the signification of imperative and complex regulatory structures for GenAI technologies in India. Thus, the study concludes that India can propel a favorable environment for GenAI adoption and innovation by solving privacy issues, strengthening the efficiency of regulatory authorities, and providing comprehensible rules. It can then play a role in the country's technological development and its use of GenAI for development gains.

6.3 Recommendations for Future Research

From the evaluation carried out in this research, the following recommendations are made to strengthen the regulation of Generative AI (GenAI) technologies in India for responsible development and utilization of the technologies while protecting futuristic research and innovation. Firstly, the foundation is needed for the regulation that would include the following aspects: considerations, security, accountability, transparency, and explainability. These elements are basic when it comes to trying to guarantee that the new genera of AI technologies, that we have called GenAI, are built and deploy fairly. The

given framework should be developed with the help of an interdisciplinary team of representatives from the industry, policy-making bodies, academia, as well as potential users of the framework – the general public. In the same regard, this framework should be revisited and reshaped from time to time in order to respond to the new technologies as well as arising ethical issues.

Issues of privacy that are linked with the use of GenAI technologies are one of the factors that would hinder the development of these technologies. Hence, in formulating the rules governing the activities of such banks, data protection and privacy ought to receive the attention they deserve by having strict measures put in place that are within the best international practices. This comprises of healthy data management practices such as the use of data anonymization, the requirement for users' permission and choices on their data. Thus, for the Indian consumers, the framework can help earn their trust, which will be crucial for the use of GenAI technologies. Therefore, this study reveals that current government policies and legislation affect the success of regulatory action for GenAI. For these policies to produce maximum results, they need to be aligned with the best practices internationally while at the same time taking into considerations the prevailing socio-economic environment in India. This can be done through interaction and partnership with leaders of the international regulatory agencies and AI ethicist groups. Moreover, there should be rules and regulation on the proper conduct of GenAI so as to avoid people or organizations to misuse it and consequently cause harm to the society.

The involvement of Indian regulatory bodies in impact development of GenAI technologies is inevitable. To improve that performance the above bodies must be supported by adequate resources, skilled manpower and legal mandates to enforce those rules and regulations. Capacity building in the form of, training and development programs should be introduced to enhance the abilities of the regulatory staff in the management of

GenAI technologies. Moreover, the formation of a specialized agency on AI could possibly coordinate the actions and make the approach of regulating the development and deployment of GenAI technologies more unified. Thus, it is suggested to encourage the ethical and sustainable AI development through incentives and R&D investments in GenAI. This include; funding, collaboration between colleges and companies, and the creation of AI research centers. Through having a strong focus on responsible innovation, India can take up a place in the global market of AI and make the possible advantages of GenAI technologies as big as possible and the possible disadvantages as small as possible. Therefore, it can be concluded that India must follow an elaborate and non-static model of regulation in order to address the challenges of GenAI technologies so as to incorporate it into society in an ethical and beneficial manner.

6.4 Conclusion

In conclusiom, the work examines the governance issues that underpin and the rules that are imperative for the regulation of generative AI (GenAI) tools. The considerations of security standards, accountability, transparency, and explainability are the main regulatory aspects of GenAI technologies, and the hypothesis of the research states that these elements are significantly different when applied to GenAI technologies. Thus, using the lens of privacy and power, the study points to the barriers that prevent the liberalisation of GenAI in India. The following is evident; these are vital concerns that need to be addressed so as to come up with sound regulations that will be accepted by stakeholders.

The study also discusses the presence of current government policies and legislation on regulating the measures of GenAI technologies. This is proved through the fact that the current policies and legislative frameworks have a great impact on the regulation efficiency, thus the importance of proper regulations that are also up to date to match the advancing technology. The degree of influence of Indian regulatory bodies on the adoption

and usage of GenAI technology is also measured, which has a significant effect on the technology's acceptance. The results imply that regardless of the critical role of these bodies, there is still a need to enhance the strategies and abilities of those to effectively manage the GenAI technologies.

Moreover, the study investigates existing regulations and their implications for futuristic research and innovation, finding that the lack of clear and comprehensive regulations poses challenges for stakeholders. The prescribed regulations significantly impact research and innovation, indicating the necessity for a well-defined regulatory framework. Based on the findings, the study recommends a robust regulatory framework tailored to GenAI technologies, emphasizing the importance of adaptive and forward-thinking policies to support technological innovation while ensuring ethical and secure use.

In conclusion, this research provides valuable insights into the regulatory landscape of GenAI technologies in India. It emphasizes the need for enhanced regulatory measures, informed by privacy concerns, power dynamics, and the evolving nature of AI technologies. By addressing these factors, India can foster a conducive environment for the responsible and innovative development of GenAI technologies, ultimately benefiting futuristic research and innovation.

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APPENDIX A:

SURVEY QUESTIONNAIRE

1. **Educational Background:**
    a. High School
    b. Higher Secondary
    c. Bachelor's Degree
    d. Master's Degree
    e. Doctorate/Ph.D.
    f. Other
2. **Current Employment Status:**
    a. Student
    b. Unemployed
    c. Employed
    d. Govt. Employee
    e. Retired
    f. Other

Structure Questionnaires

1: Strongly Disagree, 2: Disagree, 3: Neutral, 4: Agree and 5: Strongly Agree.

3. **Generative AI technologies**

Statement	1	2	3	4	5
Generative AI technologies are useful in enhancing productivity.					
I believe that Generative AI enhances creativity.					
Generative AI technologies have the potential to revolutionize industries.					
I believe Generative AI can improve decision-making processes.					
I believe Generative AI will play a crucial role in future technological advancements.					

4. Important aspects/elements of regulations

Statement	1	2	3	4	5
Considerations					
Considerations for potential societal impact should guide the deployment of generative AI technologies.					
Developers should assess the long-term consequences of generative AI applications on diverse communities.					
Continuous ethical reviews should be conducted during the lifecycle of generative AI systems.					
Security Standards					
Generative AI systems should undergo rigorous security audits regularly.					
There should be legal consequences for organizations that fail to meet minimum security standards for generative AI.					
Users should have confidence that their data is secure when interacting with generative AI applications.					
Accountability					
Accountability frameworks should be in place to attribute responsibility for decisions made by generative AI systems.					
Organizations should regularly conduct internal audits to ensure accountability in the deployment of generative AI technologies.					
Third-party entities should be involved in assessing the accountability of organizations using generative AI.					
Transparency					
User interfaces of generative AI applications should prioritize simplicity to enhance user understanding of system behaviour.					
There should be standardized guidelines for enhancing the transparency of generative AI algorithms.					

Organizations should actively communicate their data sources and model training processes in generative AI systems.					
Explainability					
Explainability should be a top priority in the development of generative AI technologies.					
User interfaces of generative AI applications should provide clear explanations for their decision-making processes.					
Developers should prioritize creating interfaces that offer insights into the internal workings of generative AI models.					

5. Government Policies and Legislation

Statement	1	2	3	4	5
Government policies adequately address the ethical concerns of generative AI.					
The government should prioritize fostering innovation in the generative AI industry through supportive policies.					
Government intervention is necessary to ensure fair and unbiased use of generative AI technologies.					
Legislative frameworks should require companies to disclose their use of generative AI in products and services.					

6. Indian Regulatory Bodies on Adoption of GenAI

Statement	1	2	3	4	5
Indian regulatory bodies provide clear guidelines on the ethical use of generative AI.					
Current regulations in India are sufficient to manage the risks associated with generative AI.					

Indian regulatory bodies adequately address concerns related to data privacy in the context of generative AI.					
Government support and incentives are crucial for the responsible adoption of generative AI in India.					

APPENDIX B:

DATASET

Education	Current Er	Generative	I believe th	Generative	I believe G	I believe G	Considera	Developer	Continuou	Generative	There sho	Users sho	Accountab	Organizati	Third-part
3	4	4	3	4	3	4	4	4	3	4	3	3	3	4	4
3	1	4	3	4	3	4	4	4	4	4	4	4	4	4	4
4	1	3	4	5	3	4	4	5	5	5	5	5	5	5	4
4	1	4	5	4	4	4	4	4	4	4	4	4	4	5	4
6	6	4	2	4	4	4	3	4	4	5	4	4	4	4	4
4	6	4	4	4	4	4	3	3	4	4	4	4	4	4	4
4	1	5	3	4	4	4	5	3	5	5	5	5	5	5	5
4	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4
3	1	4	3	4	4	4	4	5	4	4	4	5	4	5	3
4	1	4	4	4	3	3	5	4	5	5	5	5	5	5	5
3	5	5	5	5	4	5	4	4	4	4	4	4	4	4	3
4	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5
4	1	4	1	4	4	4	5	5	5	5	5	5	5	5	5
3	1	3	4	4	3	3	3	4	5	5	5	5	5	5	4
3	1	5	5	5	5	5	4	5	5	5	5	5	5	5	5
5	1	5	5	5	5	5	5	5	5	5	5	5	5	5	5
4	1	5	5	5	5	5	5	5	5	5	5	5	5	5	4
3	1	4	2	4	2	4	3	4	4	3	4	5	4	4	5
4	1	5	5	5	5	5	3	4	4	5	5	5	5	5	3
4	5	5	4	3	2	3	2	1	5	5	5	5	3	3	1
4	1	5	5	5	5	5	5	5	5	5	5	5	5	5	3
4	1	4	4	4	4	4	4	5	5	5	5	5	5	5	4
4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
6	6	5	5	5	5	5	4	5	4	3	3	4	4	4	4
4	1	5	5	5	5	5	5	5	5	5	5	5	5	5	5
4	1	4	4	4	4	5	3	4	5	5	5	5	5	5	5
3	1	5	5	5	5	5	5	5	5	5	5	5	5	5	5
4	1	4	3	5	4	4	4	4	4	5	5	5	5	5	5
4	1	3	3	2	4	3	3	5	5	5	5	5	5	5	5
4	1	5	5	5	3	4	3	4	4	5	5	5	5	5	5

Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	A
User interf	There sho	Organizati	Explainabi	User interf	Developer	Governme	The goverr	Governme	Legislative	Indian regi	Current re	Indian regi	Government	support
3	4	3	4	4	4	4	3	4	3	4	3	4	3	
4	4	4	4	4	4	3	4	3	4	2	2	2	3	
5	5	4	4	5	4	1	5	4	4	2	2	2	5	
4	4	4	4	4	4	3	4	4	3	3	3	4	3	
4	4	3	4	4	4	4	4	4	4	3	3	3	4	
4	4	4	4	4	4	4	4	4	4	4	4	4	4	
4	5	5	5	5	5	1	3	5	5	1	1	1	5	
4	4	4	4	4	4	3	3	3	3	3	3	3	3	
3	3	2	3	3	3	3	4	4	2	3	2	3	4	
5	3	4	3	3	4	5	3	3	5	5	3	3	1	
4	4	4	5	4	4	4	4	3	3	2	2	2	2	
5	5	5	5	5	5	5	5	5	5	5	5	5	5	
5	5	5	5	5	5	5	5	5	5	5	5	5	5	
4	4	5	5	4	5	5	5	5	5	4	2	3	3	
5	5	5	5	5	5	5	4	5	5	5	5	5	5	
5	5	5	5	5	5	5	5	5	5	1	1	1	1	
4	5	5	5	5	5	5	5	5	5	4	3	3	5	
5	4	4	3	4	4	3	4	3	4	5	5	4	4	
5	5	5	5	5	5	2	5	5	5	2	2	2	5	
4	3	2	1	2	1	3	5	2	3	3	3	3	1	
5	5	5	4	5	5	5	5	3	5	5	2	5	5	
4	4	5	4	4	4	5	5	5	4	5	2	3	3	
5	5	3	5	5	5	5	5	3	5	5	1	3	5	
4	4	2	3	4	3	3	3	3	3	3	3	4	4	
5	5	5	5	5	5	5	5	5	5	5	5	5	4	
4	5	5	4	4	4	5	4	5	5	4	2	2	4	
5	5	5	5	5	5	3	5	5	5	5	5	5	5	
5	5	5	4	4	4	3	4	4	4	5	3	3	4	
5	5	5	5	5	5	4	5	5	5	5	5	5	5	
5	4	5	5	4	4	5	5	4	4	4	4	4	4	