EXPLORING THE CHALLENGES OF ARTIFICIAL INTELLIGENCE IN DATA INTEGRITY AND ITS INFLUENCE ON SOCIAL DYNAMICS

Abstract

This study examines the ethical challenges and regulatory dynamics of Artificial Intelligence (AI) in relation to data integrity and its influence on social dynamics. Employing a cross-sectional survey approach, primary data was collected from 650 AI practitioners across various sectors, encompassing developers, data scientists, ethicists, and policymakers. The study investigated the correlations between regulatory compliance, ethical awareness, professional training, and experience in AI practice with the effectiveness of AI implementation and data integrity. Our findings revealed a strong positive correlation between higher levels of regulatory compliance and perceived effectiveness in AI implementation, as well as between AI ethics awareness and data integrity assurance. Moreover, a significant relationship was observed between professional training in AI and its positive impact on social dynamics. However, experience in the AI field, while positively correlated, showed a weaker link to data integrity, indicating that experience alone is insufficient for ensuring effective AI practices. The study highlights the importance of ethical considerations, regulatory frameworks, and professional training in shaping AI development and its societal implications. The need for dynamic, adaptable, and inclusive regulatory frameworks that can align AI practices with societal values and ethical norms is emphasized. Future research directions include exploring AI ethics and regulation in diverse cultural contexts and the impact of emerging technologies like quantum computing on AI ethics.

Keywords: Artificial Intelligence, Data Integrity, Social Dynamics, Ethical Challenges, Regulatory Compliance, AI Governance, Privacy Concerns, Bias in AI, Digital Social Engineering, AI Policy.

1. Introduction

In the contemporary landscape of technological innovation, Artificial Intelligence (AI) stands at the forefront, heralding a new era of digital capabilities [1]. The integration of AI into various facets of society—from healthcare and education to finance and governance—has underscored its transformative potential. However, as AI systems become increasingly sophisticated, they bring to light a range of ethical challenges that are pivotal to address [2]. This study seeks to navigate these challenges, focusing on the implications of AI in data integrity and its influence on social dynamics, a subject that has become increasingly relevant in our technology-driven world.

AI's ability to process and analyze vast datasets has been a boon for efficiency and innovation, enabling breakthroughs in fields such as predictive analytics, personalized medicine, and autonomous systems [3]. However, this capability also raises significant ethical concerns, particularly regarding the integrity of the data AI systems rely on. Instances of data manipulation, whether intentional or due to inherent biases in algorithms, pose serious questions about the reliability and fairness of AI-driven decision-making [4]. These biases, often stemming from the data AI is trained on or the

predispositions of its creators, can lead to skewed outcomes, perpetuating societal disparities and injustices. This aspect of AI technology challenges not only the ethical framework within which these systems operate but also the broader societal implications of their deployment [3].

Further complicating this landscape is the advent of AI technologies capable of replicating personal and biological identities, such as those used in deepfake videos. These technologies can create highly realistic yet entirely fabricated representations of individuals, blurring the lines between reality and fiction [5]. The potential misuse of these technologies in spreading misinformation, committing fraud, or violating personal privacy presents a dire threat to the notions of authenticity and trust. This capability of AI to mimic human identity extends beyond mere technological prowess, touching upon profound ethical, legal, and social considerations [6].

The influence of AI extends into the realm of social dynamics as well. Through applications in social media algorithms, predictive analytics, and other forms of digital interaction, AI has the power to shape public opinion, influence social behavior, and even impact democratic processes [7]. The ethical implications of such influence are vast and multifaceted, raising concerns about digital social engineering, the erosion of trust in digital platforms, and the potential manipulation of societal norms and values [8].

Despite the urgency of these challenges, the development of comprehensive regulatory and ethical frameworks governing AI remains in its infancy [9]. The rapid evolution of AI technologies often outpaces the establishment of corresponding guidelines and legal safeguards, creating a gap in addressing these critical ethical issues. This study aims to bridge this gap by providing an in-depth analysis of the ethical challenges posed by AI, particularly in the realms of data integrity and social dynamics [10].

Problem statement

In the contemporary digital landscape, where Artificial Intelligence (AI) is rapidly transforming every facet of our lives, there emerges an imperative to scrutinize the ethical dimensions of this technological revolution. [11]. The burgeoning capabilities of AI in data manipulation, bias introduction, and personal identity replication present a conundrum that straddles the domains of technology, ethics, and societal impact [12]. This research aims to dissect and understand the multifarious ethical challenges that AI poses, particularly in terms of data integrity, and its cascading effects on social dynamics.

Central to this investigation is the phenomenon of data manipulation and inherent biases in AI systems. In a world increasingly guided by data-driven decisions, the integrity of data processed by AI becomes critically consequential. When data is manipulated, either intentionally or through systemic biases ingrained in AI algorithms, the resulting decisions can perpetuate inequalities and societal discord [13]. This study will delve into the mechanisms through which AI systems can be manipulated or become inherently biased, assessing the implications of such developments on societal structures and individual agency.

Moreover, this research will explore the unprecedented capability of AI technologies, such as deep learning algorithms, to replicate personal and biological identities. Technologies like deepfakes, capable of generating highly realistic and yet entirely fabricated audio-visual content, pose alarming threats to the concepts of truth, privacy,

and authenticity [14]. This study seeks to unravel how the cloning of personal attributes, such as voice, facial features, and mannerisms, leads to unprecedented challenges in privacy, security, and identity verification, thereby complicating legal frameworks and blurring ethical boundaries.

The broader implications of these AI-driven manipulations on social dynamics, particularly through digital social engineering, will also be a focal point of this study. The potential of AI to influence public opinion, manipulate social behavior, and spread misinformation threatens the foundational principles of informed decision-making and democratic governance [15].

In synthesizing these considerations, this research will offer a comprehensive analysis of the ethical challenges posed by AI in the realms of data integrity, personal identity manipulation, and social dynamics. The investigation aims to contribute to the development of ethical frameworks and regulatory measures for AI, ensuring that this transformative technology advances in a manner that upholds human dignity, promotes social welfare, and navigates the delicate balance between technological innovation and ethical responsibility.

Research Aim

This study aims to critically investigate and articulate the multifaceted ethical challenges presented by Artificial Intelligence (AI) in the context of data manipulation, inherent biases, and the replication of personal identity. The primary objective is to examine the mechanisms through which AI can manipulate data and introduce biases, assessing the implications of these developments on societal structures, individual rights, and the integrity of democratic processes. Furthermore, the study seeks to explore the emerging phenomenon of AI-enabled replication of personal and biological identities, delving into the ramifications of such technology for individual privacy, security, and the broader socio-ethical fabric.

Research Objectives

To ensure a focused and comprehensive approach to addressing the research aim, we reduced the research aim into four distinct research objectives, with each objective targeting specific aspects of the ethical challenges posed by Artificial Intelligence (AI) in data integrity, personal identity replication, and social dynamics:

1. To Examine the Mechanisms of Data Manipulation and Bias Introduction in AI Systems
2. To Assess the Impact of AI-Driven Data Manipulation and Bias on Societal Structures and Individual Rights
3. To Investigate the Implications of AI-Enabled Replication of Personal and Biological Identities
4. To Propose Ethical Frameworks and Regulatory Measures for AI Development

Research Hypothesis

H_1: Higher levels of regulatory compliance (LRC) in AI practices are positively correlated with the perceived effectiveness in AI implementation (PEAI).

H_2: AI practitioners with greater awareness of AI ethics (AAE) demonstrate a higher degree of data integrity assurance (DIA) in their projects.

H_3: Professional training in AI (PTA) is significantly associated with a positive impact on social dynamics (ISD) through AI applications.
H_4: Experience in the AI field (EAF) is a predictive factor for the effectiveness of AI systems in maintaining data integrity (DIA).

Justification of the study
By delving into the ethical challenges presented by AI, this study aims to contribute to the discourse on responsible AI development, proposing frameworks that ensure AI advances in a manner that upholds ethical principles and promotes the welfare of society. The need for such research is imperative, as it will not only inform policy-making and guide technological innovation but also shape the future trajectory of AI in a way that is aligned with societal values and ethical considerations.

2. Literature Review

Since the advent of artificial intelligence, and its adoption in various contexts, its potentials have proven to be numerous, and its possibilities endless. For instance, Di Vaio [16] asserts that AI significantly enhances data integrity by reducing human error and increasing efficiency in data processing. In support of this perspective, Yigitcanlar et al. [17] also posit that advanced algorithms and machine learning models (functions of AI) are capable of handling large data sets more accurately than humans, thus improving the quality of data analysis. However on the contrary, Tagde et al. [69] argues that AI systems are only as good as the data they are fed and how they are programmed, thus a concern that if the input data is flawed or biased, AI will amplify these issues. This perspective stresses the ethical responsibility in data curation and the need for transparency in AI algorithms to ensure data integrity. Similarly, Landon-Murray et al. [18] highlights that AI systems often inherit biases present in their training data, including historical and societal biases that are unwittingly encoded into AI, leading to discriminatory outcomes in areas like recruitment, law enforcement, and loan approvals. However, it is worthy of note that regarding the proficiency of AI systems, if properly designed and monitored, they can aid the identification and mitigation of human biases. By setting specific parameters and continuously updating algorithms, AI can be used as a tool to promote fairness and objectivity [19].
Another critical concern of the proliferation of AI is its capability to develop AI-Enabled Replication of Personal and Biological Identities in images, videos and graphical representations which constitutes a threat to privacy, personality and social coordination [20]. Although some studies focus on the potential creative and beneficial applications of this technology in areas like entertainment, art, and even in certain legal scenarios where recreating scenarios or identities could be useful [21]. There is a need for the advocacy for a balanced approach to regulating such technologies, as [22] contends that the ability of AI to replicate human identities through technologies like deepfakes is seen by many as a significant threat to privacy and authenticity. This viewpoint underscores concerns about misinformation, misrepresentation, impersonation, identity theft, and the erosion of trust in digital content [23].
Furthermore, the influence of artificial intelligence on social dynamics reflects its ability to serve as a manipulative tool with potentials to causes numerous structural damages to societal balance. Shen et al., [46]. emphasizes the role of AI in potentially

manipulating public opinion and social behavior, especially through algorithms used in social media and news dissemination. Concerns revolve around the creation of echo chambers, spread of misinformation, and the undermining of democratic processes. On the other hand, Corvalán [45] argue that AI, through its data-processing capabilities, connects people more effectively and can be used to raise awareness about critical social issues. This viewpoint highlights the positive role AI can play in enriching social interactions and informing the public.

Evolution and Integration of Artificial Intelligence

Recently, the explosion of big data and advancements in machine learning algorithms have propelled AI into a new era where AI systems have become more sophisticated, capable of complex tasks like speech recognition, image analysis, and autonomous decision-making [47]. This era has been characterized by the integration of AI into everyday life, with its applications ranging from personal assistants to predictive analytics in various sectors. As AI systems increasingly rely on large datasets for training and operations, issues of data integrity have come to the forefront. Concerns include data accuracy, quality, privacy, and security. The integrity of AI decisions is directly linked to the integrity of the data it processes, raising questions about bias, transparency, and accountability in AI systems [62].

AI's impact on social dynamics is profound and multifaceted. On one hand, AI has the potential to enhance social welfare, offering solutions in healthcare, education, and urban planning. On the other hand, it poses challenges in terms of privacy, employment, and societal equity. The role of AI in media, social networking, and information dissemination has particularly highlighted its influence on social dynamics [63]. Algorithms can shape public opinion, create echo chambers, and even influence electoral processes, raising significant ethical and societal concerns. In essence, the evolution of AI from a theoretical concept to a pervasive force in modern society brings with it a complex array of challenges to data integrity and social dynamics, consisting both technological achievements and ethical quandaries, thus necessitating a continuous and rigorous examination of its development and impact [61].

Application of AI across various fields

The applications of Artificial Intelligence (AI) have permeated a wide array of sectors, each showcasing unique implications for data integrity and social dynamics. The diversity of these applications underscores AI's transformative potential while simultaneously highlighting the ethical and societal challenges that arise from its use [14].

In healthcare, AI algorithms analyze vast datasets for diagnostic purposes, patient care, and treatment recommendations. The integrity of this data is paramount, as inaccuracies can lead to misdiagnoses or inappropriate treatments [65]. However, AI's role in healthcare highlights not only its potentials to influence patient-doctor interactions (potentially enhancing personalized care), but also raising concerns about the depersonalization of healthcare and patient privacy. Similarly, in the financial sector, considering that integrity of data is crucial for accurate risk analysis and maintaining financial stability, AI is used for fraud detection, risk assessment, and algorithmic trading [66]. Although AI-driven automation in finance impacts employment in the sector, it also

raises questions about the equitable distribution of financial services, potentially deepening existing economic divides. Furthermore, the potential of AI as a tool for manipulating financial records cannot be overemphasized, thus signifying the necessity of regulatory frameworks and measures to regulates its use in the industry [67].
AI applications in education, like personalized learning platforms, depend on accurate data to provide tailored educational experiences. Data integrity affects the effectiveness and fairness of these educational tools [16,25]. AI in education can democratize learning by providing accessible educational resources, but it also risks reinforcing educational disparities through unequal access to technology. AI has also been found to aid cheating, plagiarism, and raising concerns of unethical use to produce academic works that are unreal, and unoriginal [26]. Given its use in media, AI is leveraged for content recommendation and creation as the data guiding these algorithms affects the diversity and accuracy of the content presented to users. But then, AI is also capable of media consumption patterns, potentially shaping public opinion and cultural norms, and then aggravating the creation of echo chambers and the spread of misinformation [27].
More prominently is the use of AI, as its organizations are beginning to rely on AI-driven personalized marketing and inventory management and customer data generation. The accuracy of this data directly influences business efficiency and customer experience, thus understanding consumer behavior and expectations, but also brings up issues related to consumer privacy and the impact of AI on small businesses and traditional retail models [28]. Apparently, the integrity of data used by AI systems is foundational to their effectiveness and ethical operation, while their influence on social dynamics highlights the broader societal impacts of this technology. As AI continues to evolve and integrate into various sectors, addressing these concerns becomes imperative to harness its potential responsibly and equitably [29].

3. Ethical Challenges in Artificial Intelligence

Roberts et al. [30] argue that data integrity involves not only ensuring the accuracy and quality of data but also addressing ethical concerns such as privacy, security, and accessibility. Their work highlights the need for a holistic approach to data ethics, one that considers the impact of AI on diverse stakeholders and respects fundamental ethical principles. Olaniyi et al., [31] illuminates the paradoxical nature of AI systems, stating that while designed for efficiency and accuracy, these systems can exacerbate issues of data integrity if the input data is flawed or biased. This duality presents a critical challenge for AI developers and users, emphasizing the need for rigorous data governance and algorithmic accountability.
Almeida et al. [14] expands the conversation around data integrity by focusing on the representativeness and fairness of data sets used in machine learning revealing how biases in data can lead to discriminatory outcomes, particularly affecting marginalized groups. This perspective necessitates for more inclusive and equitable practices in data collection and algorithm design, highlighting the social responsibility of AI practitioners [32]. Data manipulation in AI can occur at various levels, from the collection process to the algorithmic processing of data. Studies highlights several instances where data manipulation has led to unreliable AI outputs. For instance, highlights how biased data sets can lead to discriminatory outcomes in AI applications like predictive policing and hiring algorithms. Another critical aspect discussed in the literature is the phenomenon

of overfitting in machine learning, where AI models too closely align with specific data sets and lose their predictive accuracy for broader applications. This issue, as explored by Olaniyi et al. [33], underscores the challenges in ensuring that AI systems generalize well from training data to real-world scenarios. The implications of data manipulation are far-reaching. Research by Bhima [34] delves into the 'black box' nature of many AI systems, where the lack of transparency in how data is handled can lead to mistrust and ethical concerns, particularly in high-stakes areas like healthcare and criminal justice.

Bias in AI Systems

The research landscape on AI biases is extensive, delving into various forms such as gender, racial, and socioeconomic biases. Olaniyi and Omubo[35] highlighting gender and racial biases in facial recognition technologies, demonstrates how these AI systems have higher error rates for women and people of color. This line of research underlines the disparities in AI accuracy and performance across different demographic groups. Socioeconomic biases in AI are another area of concern, as explored by Burton and Soare [36], on automated decision-making systems in public services and how AI can perpetuate economic inequalities, often adversely impacting low-income communities through biased algorithmic assessments in areas like welfare distribution and credit scoring.

The sources of biases in AI are multifaceted. As identified by El Hajj and Hammoud[37] when training AI algorithms historical and societal prejudices can be embedded in the training data, leading AI systems to replicate and amplify these biases. In addition, Olaniyi et al.[38] indicates that the underrepresentation of certain groups in AI development teams can inadvertently lead to the oversight of biases in AI systems, hence inclusion and diversity in AI research and development is necessary to mitigate such biases.

The impact of biases in AI on decision-making and societal norms is profound. El Hajj and Hammoud [37] discusses how biased AI systems in recruitment and hiring can reinforce discriminatory practices, limiting opportunities for marginalized groups. Similarly, biased AI in criminal justice, as studied by Steels and López de Mantaras [39], can lead to unfair sentencing and policing practices. Even more disturbing is the possibility of societal norms and perceptions to be shaped by these biases, as AI systems, particularly those used in media and advertising, can perpetuate stereotypes and influence public perceptions about different demographic groups which in turn, impacts societal attitudes and reinforces existing social hierarchies.

4. AI and Personal Identity: Security and Privacy Concerns

The intersection of Artificial Intelligence (AI) with personal identity, particularly in the context of technologies like deepfakes, presents a significant area of concern regarding security and privacy. Deepfake technology, which uses AI algorithms to create highly realistic yet fabricated images and videos, has garnered considerable attention in recent research. Studies by Olaniyi et al.[40] have been pivotal in highlighting the potential for deepfakes to disrupt notions of truth and authenticity, as deepfakes can be used to create convincing forgeries of individuals, posing serious threats to personal identity and privacy. Studies have shown that the ability of deepfakes to replicate identities extends beyond visual representations. Research by Ali & Abdel-Haq. [41] demonstrates the

capabilities of AI in mimicking voices, further complicating the challenges in distinguishing real from fake content. This technology raises significant security concerns, particularly in the context of identity theft and fraud. Privacy concerns associated with AI's interaction with personal identity constitutes major concerns, as the implications of AI-driven data collection and processing on individual privacy rights can infer sensitive personal information, often without explicit consent, leading to potential privacy violations. Nishant et al., [1] on the concept of 'surveillance capitalism' further illustrates how AI is used to monitor and profile individuals at an unprecedented scale, often for commercial purposes, raising questions about the erosion of privacy in the digital age.

Apart from deepfakes, several other AI technologies contribute to the complexities surrounding personal identity issues, each with unique implications for privacy and security [30]. For instance, AI-driven facial recognition technology is widely used for various purposes, from security surveillance to personalized advertisements [41]. Although the technology involves the use of algorithms to identify individuals based on their facial features, there are significant privacy concerns, as this technology can be used without consent, leading to unauthorized surveillance and data collection [2]. Studies have also highlighted issues with accuracy, especially in correctly identifying individuals from certain racial and ethnic backgrounds, raising concerns about racial bias and discrimination.

Another AI technology constituting personal identity issues include predictive analytics uses AI to analyze data and make predictions about future behavior [69]. This technology which has gained prominence in in sectors like finance, healthcare, and law enforcement can infringe on personal privacy by making inferences based on personal data, sometimes leading to incorrect or harmful conclusions, such as in law enforcement where predictive policing tools have been criticized for reinforcing racial biases and targeting specific communities [3]. Biometric systems like fingerprint scanning, iris recognition, and voice recognition use unique biological characteristics for identification and authentication also raises privacy issues, as this data is highly sensitive and, if compromised, can lead to severe security breaches, with other concerns about the storage and management of such sensitive data. Also, AI tools used in social media platforms analyze user data to customize content, advertisements, and even predict user behavior have proven to have capabilities to infringe on privacy by extensively tracking user behavior and preferences, often without explicit user consent, thus the risk of such data being used for manipulative purposes, like targeted political campaigns or spreading misinformation [4].

Evidently, these technologies, while offering numerous benefits, also pose significant challenges to personal identity and privacy [42]. The ethical use of these technologies requires careful consideration of privacy implications, the accuracy of the systems, and the potential biases they may harbor, underscoring the necessity of development of regulatory frameworks and ethical guidelines, crucial to ensure that these technologies are used responsibly and respectfully. The regulatory and ethical implications of AI in relation to personal identity and privacy are significant, as Zajko[5] contends for the need for greater transparency and accountability in AI systems to protect individual rights, ands advocates for regulatory frameworks that can keep pace with technological

advancements and safeguard against abuses in AI-driven identity replication and privacy intrusions.

Implications for Individual Privacy, Security, and societal concerns

The implications of AI technologies on individual privacy, security, and broader ethical concerns are profound and multifaceted, impacting not only the individuals directly involved but also shaping societal norms and expectations. AI technologies, particularly in social media, e-commerce, and smart devices, often collect vast amounts of personal data. The concern arises when this data collection happens without explicit consent or awareness of the individuals, leading to privacy intrusions. Edwards [6] highlights how this data is often used for profit-driven motives, without regard for individual privacy. More disturbing is the use of AI in surveillance technologies, like facial recognition, which has raised alarms about the constant monitoring of individuals which not only infringes on the right to privacy but also creates an environment of perpetual surveillance, as discussed by Bistron& Piotrowski [4].

The security concerns in AI includes the risk of data breaches where sensitive personal information can be stolen and misused, as noted by security experts like Olaniyi et al. [43]. Also, the misuse of AI technologies themselves, such as deepfakes in creating false narratives or impersonations, poses a threat to personal security [11]. Furthermore, in sectors like autonomous vehicles or healthcare, the reliability of AI systems is a security concern as faulty or biased AI decisions or system failures can lead to accidents or health risks, raising ethical questions about the deployment of AI in safety-critical areas [23].

Disturbingly, as touching the implications of AI, it is evident that massive trouble looms, as several cases continually emerges which threatens social and personal serenity. Almeida et al., [14] notes that AI systems can perpetuate and amplify existing societal biases, leading to discriminatory outcomes, which are particularly concerning in areas like law enforcement, job recruitment, and credit scoring, where biased AI decisions can have serious life-altering implications. Moreover, the increasing use of AI in disseminating information and interacting with individuals raises concerns about the erosion of trust, as the inability to distinguish between AI-generated and human-generated content, as highlighted by Olaniyi et al. [44], can lead to a general mistrust in digital content and interactions. Although there's an ongoing debate about how AI impacts human autonomy and agency, AI-driven decisions, especially in areas like predictive policing or personalized advertising, can subtly influence human choices, raising ethical questions about the extent to which AI should be allowed to shape human behavior and decision-making processes [44]. While AI technologies offer remarkable benefits, they also pose significant challenges to individual privacy and security, and present broader ethical dilemmas. Addressing these concerns requires a concerted effort towards ethical AI development, including robust data protection measures, transparency in AI algorithms, and the establishment of regulatory frameworks that prioritize individual rights and societal welfare [30].

5. AI's Influence on Social Dynamics and Behavior

The exploration of AI's influence on social dynamics and behavior, particularly through digital platforms, is a critical area of study in understanding the broader societal implications of this technology. The literature in this domain provides insights into how AI, embedded in various digital platforms, shapes public opinion and influences individual and collective behavior [28].

AI algorithms, particularly those used by social media and news aggregation platforms, are playing a significant role in curating the content that individuals are exposed to. Rane [11] highlights how these algorithms can create filter bubbles, limiting the diversity of information people receive and reinforcing existing beliefs, or curating a movement. This selective exposure can significantly influence public opinion, often skewing it towards particular viewpoints or polarizing public opinion which leads to increased social fragmentation [26]. The use of AI in predictive analytics is another area where its influence on behavior is evident. Nguyen and Tran [13] discusses how AI, through data analysis, can predict individual behaviors and preferences, which in turn can be used to target advertisements or content, subtly influencing consumer behavior and decision-making. The ethical implications of such targeted and predictive approaches are explored by Corvalán [45], who argues that this not only challenges individual autonomy but also raises concerns about manipulation and control in the digital sphere.

The role of AI in political campaigns, particularly in the context of micro-targeting and spreading political narratives, is a growing area of concern. Shen et al., [46] examines how AI tools are employed to disseminate political propaganda and misinformation, impacting voter behavior and democratic processes. Burton and Soare [36], the use of automated bots in shaping political discourse on social media, highlights the challenges it poses to the integrity of democratic institutions and processes. Moreso, AI's role in shaping cultural and social norms is also a subject of interest, as studies suggests that AI, through media and entertainment platforms, influences societal values and cultural perceptions. For instance, Richter et al. [8] point out how AI-driven content can reinforce stereotypes or marginalize certain groups, thereby shaping cultural narratives and social norms.

Digital social engineering and its ethical ramifications.

Digital social engineering refers to the use of AI and digital technologies to influence or manipulate social behavior and decision-making processes [18]. Unlike traditional social engineering, which relies on human interaction and deception, digital social engineering uses data, algorithms, and automated systems to subtly shape individual and collective behaviors. Studies points to various mechanisms through which digital social engineering operates (Olaniyi, 2023). AI algorithms in social media, for instance, can amplify certain content over others, thus influencing what users perceive as important or true. Another mechanism is the use of AI in creating and spreading misinformation or 'fake news'. Lo [21] highlights how AI can be employed to generate convincing but false content, which can be rapidly disseminated across digital platforms, influencing public opinion and societal beliefs.

The ethical ramifications of digital social engineering are vast and multifaceted. One major concern is the erosion of individual autonomy and the right to privacy, As Leslie [47] argues that digital social engineering can lead to a form of surveillance capitalism, where individuals' data is used to manipulate their choices without their explicit consent.

Also, concerning its impact on democratic processes and institutions, the ability of AI to influence public opinion and behavior raises questions about the integrity of elections, the fairness of political discourse, and the overall health of democratic societies [48]. Moreso, the targeted manipulation of certain groups or communities can exacerbate existing social divides and inequalities, as certain populations may be more susceptible to digital manipulation than others [24].

Addressing the challenges posed by digital social engineering requires ethical oversight and robust regulatory frameworks, including ensuring transparency in AI algorithms, protecting individual data rights, and establishing norms and guidelines for the ethical use of AI in influencing social behavior, as Bhima[34] advocate for more accountable AI systems, where the mechanisms of digital influence are made transparent, and users are informed about how their data is being used.

6. Regulatory and Ethical Frameworks for AI

Artificial Intelligence (AI) represents a significant shift in global technology, prompting diverse approaches to regulation and ethical governance [24]. Global interest in establishing regulatory frameworks for AI is increasing, as governments and international organizations recognize the need to address the ethical and societal implications of AI. Although significant strand of the literature debates the sufficiency and effectiveness of current regulatory and ethical frameworks in addressing the challenges posed by AI, the works of Almeida et al. [14] and Roberts et al. [30] provide a comparative analysis of AI policies and regulations across the EU, UK, US, and China (regions which have been forefront in the governance of artificial intelligence and its development), highlighting the diversity in approaches and the emphasis on principles like transparency, accountability, and fairness.

The EU's GDPR-Driven Approach

The EU's approach to AI regulation is primarily rooted in the General Data Protection Regulation (GDPR), one of the most comprehensive data protection laws globally. GDPR's relevance to AI is significant due to its stringent requirements for personal data management. It sets a high bar for consent, data rights, and privacy that directly impacts how AI systems can be designed and utilized, particularly those systems that process personal data [31].

Central to GDPR's impact on AI is the principle of 'privacy by design' and 'privacy by default'. These principles mandate that privacy considerations should be embedded into the development process of AI systems from the outset, rather than as an afterthought. This means that AI developers and implementers need to ensure that data protection safeguards are built into their products and services, with the highest privacy settings applied by default [39].

GDPR requires that any processing of personal data by AI systems must be lawful, fair, and transparent. Lawfulness pertains to having a legal basis for data processing (e.g., user consent, legitimate interest), fairness relates to not processing data in ways that have unduly adverse effects on individuals, and transparency means individuals must be informed about how their data is being used [15].

For AI applications deemed high-risk, GDPR necessitates conducting DPIAs. These assessments are tools for systematically analyzing, identifying, and minimizing the data protection risks of a project or plan. DPIAs are crucial for AI as they force developers

and operators to scrutinize the potential privacy impacts of their AI systems, consider alternatives, and implement measures to mitigate these risks [53].
Recognizing the broader implications of AI, the EU has gone beyond GDPR to establish AI-specific guidelines. The Ethics Guidelines for Trustworthy AI, developed by the High-Level Expert Group on AI, lays out key ethical principles for AI development and deployment. This includes ensuring AI systems are accountable, safeguarding data privacy, ensuring transparency (including explainability of AI decisions), and promoting fairness to avoid bias and discrimination in AI systems [23].
Building on these principles, the European Commission's 2021 AI Act proposal introduces a novel, risk-based framework for AI regulation. This framework categorizes AI systems based on the potential risk they pose to safety and fundamental rights [14]. High-risk AI systems, such as those used in critical infrastructure, employment, essential private and public services, law enforcement, migration, asylum, and border control management, would be subject to strict compliance requirements. The Act aims to ensure AI systems are safe and respect existing laws on fundamental rights and values [24].

UK: Balancing GDPR Continuity with Post-Brexit Opportunities
Post-Brexit, the UK retains GDPR principles, ensuring data protection consistency. The UK's AI regulation mirrors the EU's, emphasizing data privacy, security, and ethical considerations [14,25]. The Information Commissioner's Office (ICO) plays a vital role in AI-related data protection compliance, offering guidance on AI auditing. The UK, post-Brexit, may develop its AI regulatory framework, potentially diverging from EU standards while upholding high data protection and ethical norms (Olaniyi, 2023).
Following Brexit, the UK has retained the principles of the General Data Protection Regulation (GDPR) within its domestic legal framework. This decision ensures continuity in data protection and privacy standards, which are critical for AI governance. The UK's version of GDPR, often referred to as 'UK GDPR', maintains the core tenets of the EU regulation, including the requirements for data protection, rights of individuals, and obligations for data processors and controllers [61]. The ICO, the UK's independent authority set up to uphold information rights, plays a crucial role in the realm of AI and data protection. It is responsible for monitoring and enforcing compliance with data protection laws, including the implications these laws have for AI technologies [41]. Recognizing the unique challenges posed by AI, the ICO provides specific guidance on AI auditing. This guidance is aimed at helping organizations understand and mitigate the data protection risks associated with the use of AI. The ICO’s input is instrumental in shaping how AI systems are developed and deployed in compliance with UK data protection laws (Olaniyi, 2023).

US: Fragmented Regulation and Innovation-Centric Approach
The United States takes a markedly different approach to AI regulation compared to the EU and the UK. There is no comprehensive, overarching federal legislation specifically tailored to regulate AI [59]. This absence has led to a more decentralized, sector-specific approach to AI governance. Various federal agencies in the US have developed their own guidelines and principles for AI, but these often lack the binding force of law. This results in inconsistencies in AI governance across different sectors, from

healthcare to finance, and from transportation to national security. NIST, a federal agency within the US Department of Commerce, plays a key role in developing standards and guidelines, including for AI [60]. However, NIST's guidelines are primarily recommendations rather than enforceable regulations. NIST's work in AI, along with other federal initiatives, often emphasizes the promotion and support of AI innovation. This focus aims to advance the US's competitiveness in the global AI landscape and foster technological advancements [31].

The US's approach to AI, while fostering innovation and flexibility, raises several concerns:

Firstly, unlike the EU and the UK, where data protection laws like GDPR impose strict standards, the US lacks a similar comprehensive federal data privacy law. This can lead to concerns about how personal data is used and protected within AI systems.

Secondly, the absence of a unified ethical framework for AI allows for a wide range of interpretations and applications. This raises concerns about the ethical use of AI, particularly around issues like bias and fairness. AI systems, without stringent oversight, may perpetuate or exacerbate biases, leading to unfair or discriminatory outcomes.

Finally, the varied approach across different sectors and states can lead to a patchwork of standards and regulations. This fragmentation might hinder the development of a coherent national strategy on AI, complicating efforts for companies to comply with regulations and for consumers to understand their rights and protections.

China: State-Led AI Strategy with Emerging Ethical Considerations

China's approach to AI regulation and development is guided primarily by the state, as outlined in the New Generation Artificial Intelligence Development Plan (AIDP). The plan sets ambitious goals for China to become a global leader in AI by 2030, signifying the importance of AI in China's broader national strategy. China's approach is characterized by substantial state involvement and investment in AI. The government plays a pivotal role in steering AI development through funding, policy-making, and setting strategic priorities [64]. This state-led model is designed to accelerate AI advancements across various sectors, including healthcare, education, and notably, national defense. The AIDP emphasizes integrating AI technologies into a wide range of sectors. This includes not just the tech industry, but also traditional industries, public services, and defense. The aim is to harness AI for economic growth, improved public services, and enhanced national security [32].

Recognizing the growing importance of ethical considerations in AI, China has recently started to develop guidelines and principles around the ethical use of AI. These initiatives indicate an increasing awareness of the need for ethical governance in AI, addressing issues such as fairness, transparency, and the impact of AI on society [49]. The Personal Information Protection Law (PIPL) akin to the EU's GDPR, marks a significant step in China's efforts to regulate data privacy and protection. It introduces rules on data processing, consent, and data subject rights, applying these standards to AI systems that process personal information [31]. While there is a growing emphasis on ethical governance in AI, this is often balanced with state interests and objectives. The Chinese government's approach tends to prioritize national security and societal stability, alongside the benefits of AI innovation. AI policies in China are often aligned with broader state interests, including economic development, social governance, and

national security [50]. This can sometimes lead to tensions between promoting ethical AI use and advancing state-led objectives. China’s approach to AI, balancing state-led innovation with emerging ethical considerations, has significant implications for the global AI landscape. It presents a model where state direction and control play a central role in shaping AI development, offering a contrast to more market-driven approaches seen in other regions.

In essence, the AI regulatory frameworks in the EU, UK, US, and China present a spectrum of approaches, each shaped by their unique societal values and priorities. The EU and UK’s strong emphasis on data protection and ethical considerations contrasts with the US's focus on innovation and China's state-led approach, beginning to incorporate ethical considerations [51]. As AI technology continues to advance, these frameworks must evolve to address new challenges, ensuring AI development aligns with societal values, ethical principles, and individual rights. Understanding these diverse approaches provides valuable insights into potential paths for AI governance globally and highlights the need for continuous adaptation to emerging technological and societal challenges [52]. It is important to note that AI regulation is a rapidly evolving field, and many countries are in the process of developing or refining their approaches to AI governance. The challenge lies in balancing the promotion of innovation and economic growth with the need for safety, privacy, ethical standards, and the protection of citizens' rights [27].

3. Methods

In this cross-sectional survey study, we collected primary data from a diverse group of professionals actively engaged in the Artificial Intelligence (AI) sector. For the purpose of our research, we identified these individuals as "AI practitioners." This encompassed a broad spectrum of professionals including, but not limited to, developers, data scientists, AI ethicists, policy makers, and others who are directly involved in AI development, application, or regulation. Our target population included AI practitioners from various sectors such as academia, industry, government agencies, and non-profit organizations. We chose a sample size of 650 respondents, which was determined to provide a comprehensive and representative overview of the AI community. The sampling method combined purposive and snowball techniques. Data was collected through a structured questionnaire, which was meticulously designed to gather insights on various aspects of AI practices and perspectives. The questionnaire was disseminated electronically via email and professional networking platforms. A follow-up reminder was sent two weeks post the initial distribution to maximize response rates. The data collection spanned approximately four weeks. The responses were analyzed using descriptive statistics, which provided a summary of the participants' characteristics and responses. This approach was instrumental in identifying prevailing trends and patterns among AI practitioners. For hypothesis testing, we employed both correlation and regression analyses.

4. Findings and Discussion

Hypothesis 1

Table 1. results of Correlations for hypothesis 1

		LRC in AI practices	Perceived effectiveness in AI implementation
LRC in AI practices	Pearson Correlation	1	.988**
	Sig. (2-tailed)		.000
	N	650	650
Perceived effectiveness in AI implementation	Pearson Correlation	.988**	1
	Sig. (2-tailed)	.000	
	N	650	650

Correlation is significant at the 0.01 level (2-tailed).

A Pearson correlation was carried out to understand the relationship between higher levels of regulatory compliance (LRC) in AI practices and Perceived effectiveness in AI implementation (PEAI). This shows that a very strong significant relationship exists (r=.988 and p=.000). With this observation, the hypothesis is accepted and can be stated that higher levels of regulatory compliance (LRC) in AI practices is significantly related to the perceived effectiveness in AI implementation (PEAI).

Hypothesis 2

Table 2.Model Summary for hypothesis 1

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.994[a]	.988	.988	.159

a. Predictors: (Constant), AI Ethics

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1304.630	1	1304.630	51648.029	.000[b]
	Residual	16.368	648	.025		
	Total	1320.998	649			

a. Dependent Variable: Data Integrity assurance

b. Predictors: (Constant), AI Ethics

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.026	.014		-1.794	.073
	AI Ethics	.505	.002	.994	227.262	.000

a. Dependent Variable: Data Integrity assurance

For a sample size of 650 respondents, a regression analysis was carried out to evaluate the relationship that exists between the dependent variable (Data Integrity assurance) and the independent variable (AI Ethics). The result shows that a positive significant relationship exists between this two variables (r=.994, p=.000). The Beta value which is closer to 1 (Beta = .994) also affirms the significant of the positive relationship, which connotes that AI practitioners with greater awareness of AI ethics (AAE) demonstrate a higher degree of data integrity assurance (DIA) in their projects. Therefore, the hypothesis is accepted.

Hypothesis 3

Table 3. Results of Correlations for hypothesis 3

		Professional training in AI (PTA)	Impact on social dynamics (ISD) through AI applications.
Professional training in AI (PTA)	Pearson Correlation	1	.997**
	Sig. (2-tailed)		.000
	N	650	650
Impact on social dynamics (ISD) through AI applications.	Pearson Correlation	.997**	1
	Sig. (2-tailed)	.000	
	N	650	650

Correlation is significant at the 0.01 level (2-tailed).

A Pearson correlation was carried out to understand the relationship between Professional training in AI (PTA) and impact on social dynamics (ISD) through AI applications. It was observed that a very strong positive relationship (r=.997 and p=.000) exist between the two variables. The result therefore depicts that Professional training in AI (PTA) is strongly significantly related to have a positive impact on social dynamics (ISD) through AI applications. With this, the hypothesis is accepted.

Hypothesis 4

Table 4.Model Summary for hypothesis 4

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.305[a]	.093	.092	1.074

a. Predictors: (Constant), Experience in the AI field (EAF)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	76.492	1	76.492	66.372	.000[b]
	Residual	746.795	648	1.152		
	Total	823.286	649			

a. Dependent Variable: Data Integrity?"
b. Predictors: (Constant), Experience in the AI field (EAF)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.303	.103		32.195	.000
	Experience in the AI field (EAF)	.124	.015	.305	8.147	.000

a. Dependent Variable: Data Integrity"

For a sample size of 650 respondents, a regression analysis was carried out to understand the relationship between the dependent variable (Data Integrity) and independent variable (Experience in the AI field). The result shows that a positive significant relationship exists between this two variables (r=.305, p=.000). This relationship has further shown to be weak with a Beta value far from 1 (Beta= .305). This shows that although there is a significant relationship but it is very weak, thereforethe hypothesis which state that experience in the AI field (EAF) is a predictive factor for the effectiveness of AI systems in maintaining data integrity (DIA) is rejected.

The strong correlation found between higher levels of regulatory compliance (LRC) in AI practices and the perceived effectiveness in AI implementation (PEAI) aligns with previous studies emphasizing the importance of regulation in AI development. This finding resonates with the GDPR-driven approach in the EU, underscoring the significant role regulations play in enhancing the effectiveness and trustworthiness of AI systems. It corroborates the assertion by Almeida et al. [14] and Roberts et al. [30] that a robust regulatory framework is crucial for fostering effective and ethically sound AI practices. The near-perfect correlation suggests that practitioners perceive compliance with regulations not as a hindrance but as an integral component of effective AI implementation.

The significant positive relationship between AI practitioners' awareness of AI ethics (AAE) and the degree of data integrity assurance (DIA) in their projects highlights the critical role of ethical awareness in AI practice. This finding is consistent with the concerns raised by Asatiani [53] about the ethical responsibility in data curation and the transparency of AI algorithms. It suggests that when practitioners are more attuned to ethical considerations, they are more likely to ensure the integrity of the data used in AI systems. This aligns withAkintande's[54] emphasis on the need for inclusive practices in data collection and algorithm design to mitigate biases and uphold data integrity.

The observed strong correlation between professional training in AI (PTA) and a positive impact on social dynamics (ISD) through AI applications underscores the significance of education and training in shaping the societal implications of AI. This supports the notion that well-trained AI professionals can contribute to AI applications that positively influence social dynamics, countering concerns about AI's potential to manipulate public opinion or reinforce societal biases, as discussed by Panhwer and Salleh [55,68]. The results imply that comprehensive training in AI, which includes ethical and societal considerations, equips practitioners with the tools necessary to develop AI applications that are socially responsible and beneficial.

The weak but significant relationship between experience in the AI field (EAF) and the effectiveness of AI systems in maintaining data integrity (DIA) suggests that while experience is a factor, it is not a strong predictor of data integrity in AI systems. This aligns with the paradoxical nature of AI systems discussed by Nemorin [56], where design and monitoring are as crucial as experience in ensuring data integrity. It implies that other factors, such as ongoing training, adherence to ethical guidelines, and engagement with evolving regulatory standards, are equally vital in assuring data integrity in AI applications.

The findings from this study contribute to the ongoing discourse on AI's ethical and regulatory challenges. They highlight the importance of regulatory compliance, ethical awareness, professional training, and experience in shaping AI's development and its impact on society. The strong correlations observed in the first three hypotheses underscore the interconnectedness of these factors in enhancing the ethical and effective deployment of AI. The weak correlation in the fourth hypothesis, however, indicates that experience alone is not sufficient to guarantee data integrity, emphasizing the need for a multifaceted approach in AI development [57].

As AI continues to evolve, these frameworks must be dynamic, adaptable, and inclusive, addressing the diverse challenges posed by AI to ensure its responsible and beneficial use in society. The results also underscore the necessity for ongoing

education and awareness-raising among AI practitioners about ethical standards, data integrity, and regulatory compliance to foster AI systems that are not only technologically advanced but also ethically sound and socially responsible [58].

5. Conclusion and Recommendation

This study provides valuable insights into the complex landscape of Artificial Intelligence (AI), focusing on ethical challenges, regulatory compliance, and its impact on data integrity and social dynamics. The findings underscore the critical role of regulatory compliance in enhancing AI's effectiveness, as well as the importance of ethical awareness and professional training in ensuring data integrity and positively influencing social dynamics. Conversely, while experience in the AI field is beneficial, it alone does not guarantee the effectiveness of AI systems in maintaining data integrity, suggesting the necessity for a more comprehensive approach. The strong correlations observed in most hypotheses highlight the interplay between ethical awareness, regulatory compliance, and professional training in shaping responsible and beneficial AI applications. These aspects are crucial in mitigating the risks associated with AI, such as data manipulation, inherent biases, and the replication of personal identity, which pose significant challenges to privacy, security, and societal harmony.

The study recommends that policymakers should focus on developing and refining comprehensive, adaptable regulatory frameworks for AI that emphasize privacy, transparency, and accountability. This would ensure AI practices align with societal values and ethical norms. Also, institutions and organizations should invest in continuous ethical training and awareness programs for AI practitioners. This would enable them to recognize and address the ethical implications of their work, thereby ensuring data integrity and fairness in AI applications.

Future research should explore the evolving nature of AI ethics and regulation in different cultural and geopolitical contexts. Additionally, longitudinal studies could provide deeper insights into the long-term impact of AI on societal structures and individual behaviors. Investigating the role of emerging technologies like quantum computing in AI and their ethical implications would also be a valuable area of exploration.

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Appendix A

Section A: Demographic Information

A1. Age Group:
- [ ] Under 25
- [ ] 25-34
- [ ] 35-44
- [ ] 45-54
- [ ] 55-64
- [ ] 65 and above

A2. Professional Background:
- [ ] AI Development
- [ ] AI Research
- [ ] AI Policy and Governance
- [ ] Data Science
- [ ] AI Ethics
- [ ] Other AI-related field

A3. Years of Professional Experience in AI:
- [ ] Less than 1 year
- [ ] 1-5 years
- [ ] 6-10 years
- [ ] 11-15 years
- [ ] Over 15 years

Section B: levels of regulatory compliance (LRC) and perceived effectiveness in AI implementation (PEAI).

"Rate your agreement with the following statement: 'In my AI-related work, I consistently adhere to established regulatory compliance standards.'"
- [ ] 1 - Strongly Disagree
- [ ] 2 - Disagree
- [ ] 3 - Neutral
- [ ] 4 - Agree
- [ ] 5 - Strongly Agree

"On a scale from 1 to 5, how would you rate the overall effectiveness of AI implementations in your professional work?"
- [ ] 1 - Very Ineffective
- [ ] 2 - Somewhat Ineffective
- [ ] 3 - Neutral
- [ ] 4 - Somewhat Effective
- [ ] 5 - Very Effective

"How strongly do you agree that adherence to regulatory compliance has a positive impact on the effectiveness of AI projects in your experience?"
- [ ] 1 - Strongly Disagree
- [ ] 2 - Disagree
- [ ] 3 - Neutral

- [ ] 4 - Agree
- [ ] 5 - Strongly Agree

Section C: awareness of AI ethics (AAE) and data integrity assurance (DIA).
"Rate your level of agreement with the following statement: 'I am well-informed about the ethical standards and considerations relevant to AI.'"
- [ ] 1 - Strongly Disagree
- [ ] 2 - Disagree
- [ ] 3 - Neutral
- [ ] 4 - Agree
- [ ] 5 - Strongly Agree
"How would you rate the degree to which you ensure data integrity in your AI projects?"
- [ ] 1 - Very Low
- [ ] 2 - Low
- [ ] 3 - Moderate
- [ ] 4 - High
- [ ] 5 - Very High
"In your experience, how significantly does awareness of AI ethics impact the assurance of data integrity in AI projects?"
- [ ] 1 - Not at All
- [ ] 2 - Slightly
- [ ] 3 - Moderately
- [ ] 4 - Significantly
- [ ] 5 - Extremely

Section D: Professional training in AI (PTA) and impact on social dynamics (ISD)
"Please rate the extent of your professional training in AI."
- [ ] 1 - No Formal Training
- [ ] 2 - Basic Training (Short courses/Workshops)
- [ ] 3 - Intermediate Training (Certification Programs)
- [ ] 4 - Advanced Training (Degree or Specialized Programs)
- [ ] 5 - Expert Training (Multiple Advanced Programs or Extensive Experience)
"How do you perceive the impact of AI applications, developed or influenced by professionally trained individuals, on social dynamics?"
- [ ] 1 - Very Negative Impact
- [ ] 2 - Somewhat Negative Impact
- [ ] 3 - Neutral Impact
- [ ] 4 - Somewhat Positive Impact
- [ ] 5 - Very Positive Impact
"In your experience, how significantly does professional training in AI contribute to the positive impact of AI applications on social dynamics?"
- [ ] 1 - Not at All
- [ ] 2 - Slightly
- [ ] 3 - Moderately
- [ ] 4 - Significantly
- [ ] 5 - Extremely

Section E: Experience in the AI field (EAF) and data integrity in AI (DIA).
"How many years of professional experience do you have in the AI field?"
- [ ] 1 - Less than 1 year
- [ ] 2 - 1-3 years
- [ ] 3 - 4-6 years
- [ ] 4 - 7-10 years
- [ ] 5 - More than 10 years

"Based on your experience, how would you rate the effectiveness of AI systems in maintaining data integrity?"
- [ ] 1 - Very Ineffective
- [ ] 2 - Somewhat Ineffective
- [ ] 3 - Neutral
- [ ] 4 - Somewhat Effective
- [ ] 5 - Very Effective

"In your opinion, how does the level of experience in the AI field influence the ability to assure data integrity in AI systems?"
- [ ] 1 - No Influence
- [ ] 2 - Slight Influence
- [ ] 3 - Moderate Influence
- [ ] 4 - Significant Influence
- [ ] 5 - Extremely Influential

Appendix B

Professional Background

Field	Respondents number	Percentage
AI Development	122	18.8%
AI Research	109	16.7%
AI Policy and Governance	98	15.1%
Data Science	131	20.2%
AI Ethics	103	15.8%
Other AI-related field	87	13.4%

Years of Professional Experience in AI

Years of experience	Respondents number	Percentage
Less than 1 year	228	35.1%
1-5 years	397	61.1%
6-10 years	21	3.2%
11-15 years	4	0.6%
Over 15 years	0	0