Effects of Organisational Support and Innovation Culture on AI Adoption

By

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Abstract

Artificial Intelligence (AI) has emerged as a robust approach to the improvement and enhancement of organisations' performance and productivity. This research aims to investigate the effects of organisational and innovation culture on technology adoption with a specific focus on AI. Five professionals from the Irish National Transport Authority (NTA) were interviewed via a voice recording application for primary data collection. Thematic analysis has been applied in the findings of the study for qualitative analysis. Findings indicate that AI adoption in businesses is dependent on organisational culture, and efficient adoption is required to be promoted through innovative culture development. Five major themes generated in the study include AI in the business of the NTA, strategies and factors to drive adoption of AI, organisational and innovation culture influence on AI, business functions and employee performance, and future risks due to AI adoption. Study findings conclude that the NTA has developed an innovative organisational culture which has resulted in the promotion of efficient AI adoption as well as four-fold improvement in the organisational performance and productivity.

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CHAPTER 01: INTRODUCTION

Background

Within various industries the advancement and integration of artificial intelligence (AI) has improved the processes of ecosystems, decision making, and recreation of the customer experience. Recent developments in expert systems, machine learning, natural language processing, deep learning and robotics, and speech recognition are recognised to be most influential on the businesses. The domain of AI has become an active area of research in a diversity of organisations, including science, engineering, medicine, education, accounting, finance, economics, law, and marketing. Furthermore, AI has also been adopted and applied to such endeavours in healthcare, self-driving cars, and new media. According to the report of Global Enterprise, presented by Evans and Gawer (2016), a six-fold increase has been observed in the number of research studies conducted and articles generated on business strategy and AI adoption between 2013 and 2016. Current research suggests that by 2020, AI is deemed to be pervasive in software products, such as speech and facial recognition in deep learning platforms, enhancing their efficiency. However, certain limitations such as scale of integration within firms hinders the capacity of AI's rapid growth.

Most AI technology is still considered to be weak due to lack of access to effective algorithms for integration in the organisation and lack of governmental funds in the technology sector. However, the demand for innovation and the bridge between businesses and technology is developing rapidly with increasing focus of scholars and researchers in the technology sector regarding the requirements of AI in businesses. As a result, organisations are in significant need to develop AI integration models and frameworks based on increasing business competition (Alsheibani et al., 2018).

A multi-perception theory has been approached under the Technology-Organisation Environment (TOE) framework for the investigation of adoption of AI at the firm level. While another theoretical perspective, the Diffusion of Innovation theory (DOI), explains the procedures, rationale, and the costing of integration of new technology and ideas within the firm. Both theories have been identified as important for the adoption of innovative technologies within the firm. Both theoretical perspectives comply with the demands and need of organisational efficiency and performance improvement to be focused during the integration of AI based technology. For organisational efficiency and performance improvement evaluation, IT has been studied for the maintenance and sustenance of the competitive advantages within the firm.

The study of Knight (2015), asserts productivity can be increased in addition to the positive impacts through faster and better decision making, by bringing AI into the organisation. However, buying into the idea for the integration of AI is a challenge for most organisations that are not technology-oriented, nor based on an innovative organisational framework. As per the report presented by Gartner (2017), most organisations are still in the process of information gathering about whether to integrate and adopt AI in the organisational framework while only 6% organisations have been able to develop AI technology. In terms of enterprise adoption, adoption of AI into business strategy is still unclear, while the risk of ignoring AI adoption in the organisation is estimated to be significantly high.

AI has been adopted by the majority of organisations around the world. At the same time, the empirical research conducted in this domain is limited, which has resulted in restricted adoption of AI. From the research, a significant level of barriers has been identified in the adoption of technology due to underrepresented literature on these prospects, lack of funds and

investments, lack of effective information systems, and lack of organisational barriers to adoption of AI that lead to less comprehensive changes. Thus, improvement in research is required to address the strategies that can mitigate the barriers encountered by companies. Organisational barriers may include the non-innovative organisational framework, lack of effective technology integration policies, lack of skills or resources in handling adopted technology, and lack of investments on the adoption of technology required within the organisation.

While Artificial Intelligence (AI) is seen as a game-changer in driving business and gaining competitive advantage, there is a disparity between adopting AI and understanding the practical implications. Adoption of innovation is influenced by a firm's characteristics, such as technological readiness, relative advantage, firm size, and top management support (Alsheibani et al., 2018). Additionally, other aspects such as leadership, data management, agility, and innovation influence the adoption of technologies such as AI (Brock and von Wangenheim, 2019).

Businesses are turning towards AI to address the challenges of business decisions with high expectation of results (Khan et al., 2010). However, the expectations can be unrealistic as Brynjolfsson states, "we see business plans liberally sprinkled with references to machine learning, neural nets, and other forms of the technology, with little connection to its real capabilities" (Brynjolfsson and Mcafee, 2019, p. 4). This sentiment is echoed amongst AI academics and scientists in the field. Executives believe that AI will benefit their organisations by cost reductions, increased efficiencies, or new business development. In this regard, Ransbotham et al., (2017) states that firms believe AI will allow their organisation to obtain or sustain a competitive advantage.

With these factors considered and executive commitment to implement AI, only about one in five has limited implementations of AI in some offerings or processes. With only one in twenty, having broadly incorporated AI in their organisation (Ransbotham et al., 2017). There are four categories of organisational maturity to the understanding and adoption of AI. The largest group, 36% of organisations with no plans of AI adoption, are coined as "passives" or "laggards" (Brock and von Wangenheim, 2019). The second-largest group are "investigators" who understand AI, currently in the piloting phase, but not deploying beyond it. The third-largest group are "experimenters" who are currently in the pilot phase and learning by doing. Lastly, the smallest group are the "pioneers," 19% of organisations who have the understanding and incorporated AI in their business processes (Brock and Von Wangenheim, 2019). While there is extensive research on the adoption of AI in the organisation and factors that influence it, there is a gap in leadership and organisational support driving the adoption of innovation, notably AI in an Irish context.

There is an opportunity for organisations to leverage their technology, which would include AI, within their business, and to harness their data to deliver a better client experience and gain competitive advantage (Ransbotham et al., 2017). Also, studies have identified that successful implementation of innovation including AI requires business and technology strategy (Alsheibani et al., 2018; Brock and von Wangenheim, 2019; Ransbotham et al., 2017), and leadership supporting an innovation culture (Anandhi Bharadwaj et al., 2013; Gobble, 2019; Khan et al., 2010). This research aims to further build upon previous studies to establish further the impact of these factors, driving the successful implementation of innovative technologies, including AI.

Aim of the Research

The research aims to investigate the effects of organisational and innovation culture on technology adoption while focusing on the National Transport Authority (NTA), an Irish regulatory organisation that is currently implementing a number of AI technologies to both streamline its organisational practice and developing a culture of innovation.

Objectives of the Research

In order to address the research aims, the following objectives will be approached.

- To identify the effects of the organisation on technology (AI) adoption
- To identify the effects of innovation culture on the adoption of technology (AI)
- To investigate the prospects that differentiate the Pioneers for the laggards in technology adoption
- To determine the factors integrated into the organisational support which drive the adoption of technology and influence the innovation culture
- To determine the most profound effect of Denison's model on the innovation culture
- Which aspect of Denison's model has the most profound effect on the innovation culture?

Research Questions

What is the relationship between organisational support and innovation culture leading to the adoption of AI? This research aims to build upon the studies of (Brock & von Wangenheim, 2019; Sadegh Sharifirad Mohammad & Ataei Vahid, 2012) to the following:

1. Which leadership and organisational support behaviours differentiate the Pioneers from the laggards?

2. How does organisational support and which aspects influence the innovation culture and drive the adoption of technology, specifically AI?

3. Which aspect of Denison's model has the most profound effect on the innovation culture?

Rationale

As per recent reports, AI adoption has been significantly approached by the organisations aiming to improve their work efficiency, performance and productivity. There is a significant need for development, recognition and identification of effective models that enhance a firm's potential to adopt the technology. As per the study of Gartner (2017), AI has become one of the key technologies which are being considered by the organisations on a global scale for its integration. The concept of automation and the use of robots has been approached substantially as the fundamental core of AI research. To offer the perceived advantages, logic programming was introduced in Europe; however, now the focus of AI in organisations has changed significantly over the past 60 years. For all industries, it is starting to become an essential feature. A comprehensive set of training computers are involved in the concept of AI, that promotes and simplify the tasks that are based on functions of human intelligence.

Many different aspects are encompassed by AI, which includes expert systems, machine learning, robotics, and deep learning. A literature review has resulted in the identification barriers that companies have encountered during the adoption of innovation when viewing the situation from the organisational level. The predominant barriers include lack of knowledge and awareness, lack of top management support, resistance to change, lack of skills, lack of government regulations, initial cost, incompatibility and interoperability problems, security, and privacy risks. In order to address, assess and respond to these barriers, there is significant need to

research the influence of organisational and innovative culture on AI adoption and how these barriers can be mitigated with improved and optimised organisational and innovative culture.

Details have been presented in the literature outlining the barriers encountered by companies in the adoption of AI as well as in the development of effective, innovative culture for the organisations that critically require to improve their work functions. The research has highlighted the main barriers that can be commonly encountered by companies at a different phase of adoption. Recognition of different barriers is necessary, the mitigation of which requires increased AI adoption, which in turn may result in a higher degree of AI understanding at the organisational level. The major implication for companies failing to efficiently adopt AI is the lack of achievement of sustainable development goals (Vinuesa et al., 2020). Also, these companies lack the efficiency to achieve organisational outcomes, as well as gain, increased competitive advantages. For Irish organisations, this might enhance the level of opportunities in terms of gaining additional competitive advantage in the international market. Moreover, Irish companies may also enhance their digital transformation during this stage (O'Grady & Roberts, 2019). By assessing the AI adoption strategies in the NTA, the employees in the organisation can be advantaged by enhancing their knowledge of the requirements of AI technology in the public sector. The NTA can gain a competitive edge by utilising the findings of this research.

Significance of the Study

The research conducted in this study is of significant importance as it examines the effects of organisational and innovative culture on AI adoption. AI adoption is being substantially investigated due to the level of robustness and improvement it imparts in the organisations. Findings of the study will be significant for the policymakers in the organisation

who are developing policies that intend to integrate AI and technology within the organisation. Furthermore, the findings of the research will be significant in addressing the importance of compliance with organisational and innovative culture and technology-oriented frameworks. Research has highlighted the importance of AI for the improvement of work functions within an organisation. Also, evaluation of the recently developed technology-oriented frameworks for the efficient adoption of AI is necessary as it may highlight the strategies in the management of the needs of internal and external stakeholders.

In addition, research findings are important for students in the engineering domain and assessing the role of AI in sustaining businesses in the long term. The specialised areas in educational research that study findings would serve include assessment of AI related technology in organisational development, AI and business management, and current AI tools in businesses.

Problem Statement

Barriers to the integration of technology, specifically AI, have resulted in restricted performance and productivity in most organisations. Literature has highlighted these organisations as 'laggards.' In contrast, those who have efficiently adopted and integrated AI in their work functions have improved their performance and productivity have been termed the 'pioneers'. There has been identified a significantly influential role of organisational and innovation culture, and policies adopted supporting the implementation and adoption of AI. By assessing the effective organisational and innovative cultures, research findings may address the needs of organisations intending to explore effective ways for the adoption of AI. All the four business functions, i.e., supply chain, finance, marketing and operations, are positively affected

by the integration and adoption of AI. Investigations have highlighted the importance of the development of innovative culture frameworks for the adoption of AI.

Overview of Dissertation

The dissertation comprises six chapters. Chapter one introduces the research aims, objectives, research questions, rationale, significance, and problem statement. Chapter two presents the literary evidence reviewed for the dissertation covering scholarly evidence on AI definition, types and benefits, AI adoption in different types of organisations, organisational support for AI adoption, and theories on innovation culture and organisational culture. Chapter two is followed by methodology in chapter three, presenting researching design, approach philosophy, methodology, data analysis technique, and limitations. Chapter four presents the results and findings, followed by the discussion in chapter five. Finally, the conclusion is presented in chapter six.

Chapter 01 Summary

This chapter introduced the research problem under the topic, 'effects of organisational and innovative culture on technology adoption,' with a specific focus on AI. The chapter also elaborated the aims, objectives, research questions while also detailing the significance, rationale and problem statement for the study. The next section presents the scholarly evidence on AI and how AI has been adopted by organisations while being supported by the organisational and innovative culture.

CHAPTER 02: LITERATURE REVIEW

Introduction

Artificial intelligence (AI) refers to the use of technology for the simulation of human knowledge in machines that are programmed to mimic human actions and think like humans (Hassani et al., 2020). The term is often used for the tools that are designed to exhibit traits of humans, such as problem-solving and learning. In gaining a competitive advantage and driving business, AI is seen as the game-changer in the business world (Hashimoto et al., 2018). Innovation culture implemented by the organisation promotes the practices of technology adoption and technological advancement of the enterprise. Assessing the implications of innovation culture in an organisation is therefore of significant importance in current business prospects (Kaplan & Haenlein, 2019). To address the relationship through a critical review of the literature, this chapter is divided into four major sections. These include AI definition, types, and benefits; AI adoption; organisation support; and innovation culture. The first section is divided further into subsections of definition, examples, and benefits of AI, which are reviewed from literature and critically analysed. Section two contemplates the adoption of AI concerning pioneer adopters, requirements of adoption, and barriers to AI adoption. Section three is based on the organisational support for AI adoption, organisational objectives, and barriers to organisational support in the adoption of technology in the form of AI. Finally, section four is based on the innovation culture addressing the innovation and organisational culture theories, impacts of organisational culture in innovation adoption, and the importance of innovative organisational culture in today's competitive business environment.

Subsection 1: Artificial Intelligence

1a) Definition

According to Alsheibani (2018), the range of terms including 'intelligence agents,' 'machine intelligence,' 'algorithms,' 'intelligent systems,' and 'intelligent behaviours' have been used for AI due to diversity of the subject. Initially, it was recognised as the machines that can make decisions, think like humans, and provide reasons which later advanced to include the prospects that included acts and interpretations like humans. AI is believed to be better at human capabilities and may interpret information more efficiently than humans. Kaplan and Haenlein (2019, p. 1) defined AI as "a system's ability to correctly interpret external data, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation."

Narrow/General AI

The definition of AI presented by Kaplan and Haenlein (2019) fits with the narrow intelligence of AI and how it contributes to managing and processing the data. Organisations are currently employing AI as a primary analytic strategy. Gobble (2019) states that a large community of researchers has recently emerged focusing on the organisational goals and objectives that can be achieved with the help of AI, resulting in the development of software and hardware with a general intelligence similar or sometimes higher than humans. Gobble (2019) also divided AI into "narrow" and "strong," where the former refers to the AI that conducts only specific actions within a predefined context while the latter refers to the artificial general intelligence. However, given the limits of realistic time and space, it is widely accepted that there is no undefined generality of intelligence. A generalisation of intelligence through the use of AI

would enhance the use of machines in conventional practices and routines. Further concepts of time and space are required to be assessed for the AI to be understood and implemented effectively.

Hashimoto et al., (2018, p. 1) demonstrated the concept of AI with a loose definition as "the study of algorithms that give machines the ability to reason and perform cognitive functions such as problem-solving, object and word recognition, and decision-making." According to Hashimoto et al. (2018), AI was previously recognised as science fiction; however, now it has become a popular topic in both academic, practical, and organisational literature. This popularity can be attributed to the rapidly generated practical applications of AI, such as "International Business Machine's (Armonk, NY, USA) Watson and Tesla's (Palo Alto, CA, USA) autopilot."

AI/Human Interactions

According to the statements of Miller (2019, p. 12), "Human-agent interaction can be defined as the intersection of artificial intelligence, social science, and human-computer interaction (HCI)." This statement deliberately links AI with the social sciences, human-computer interaction prospects, and human-agent interaction, which are primarily focused on the development of AI. Human-computer interaction forms the basis for AI, while the integration of programs that follow social sciences is a choice that may or may not be introduced in the AI by its maker. By linking these three factors, further optimisation of AI can be approached. AI is also defined as the capability of a machinic agent to achieve goals in a wide range of environments or the capability of a machine to imitate the intelligent behaviour of humans (Aghion et al., 2017).

Adoption of AI by Companies

According to Davenport (2018), companies have been employing analytics for several decades; however, with growing competition in the business world, firms are assessing and building their capabilities in AI. Companies may integrate AI efficiently in their operations by building upon AI's analytical competencies. These competencies may surpass the human qualities in workplace settings and reduce the work burden on human employees. The ratio of errors with the introduction of analytical capabilities of AI would be less when compared to human error. As per the review and perceptions of Osoba and Welser (2017), by definition, AI is not human. The authors argue that moral judgments are typically required in the actor, such as empathy, the element of choice, and agency. No meaningful morality can be associated with AI. As for humans, moral standards are higher and rational, while in the case of AI, morality standards are adjusted by humans. Thus, the definition of AI is far from defining the moral characteristics human beings possess due to the difference in moral standards among both.

1b) Types of AI

Hassani et al., (2020) identified several classifications of AI, which have been broadly classified into two distinct categories. The first category involves reactive machines, limited memory machines, the theory of mind, and self-aware AI. The second category includes "Artificial Narrow Intelligence (ANI), Artificial General Intelligence (AGI), and Artificial Superintelligence (ASI)." These have been further discussed below.

First Classification

The first classification of AI is based on the level of similarity of AI with the human mind, and their ability to even "feel" and think like humans. The four subclassifications of the first category are as follows.

Reactive Machines

Reactive machines can only be used for the generation of automatic responses to the limited combination of inputs. These were the first AI-based system machines and did not involve memory-based operations. Reactive machines possess limited capability, and these machines cannot learn as previous experiences cannot be used as input to inform the future actions of the machine (Hassani et al., 2020). One simplified example is IBM's Deep Blue machine that beat chess Grandmaster Garry Kasparov in 1997.

Limited Memory Machines

These machines are capable of learning from the historical data to inform subsequent decisions. They possess the capabilities of purely reactive machines. The majority of all currently employed AI fall into the category of limited memory AIs, including virtual assistants and chatbots to self-driving vehicles. This AI class is extensively being used and integrated into the business. Examples of high-level algorithms in this class include Google's search mechanisms being specific for each individual's use and Google Cloud AI (Hassani et al., 2020).

Theory of Mind

Unlike the reactive machines and limited memory AIs, Theory of Mind AIs are recognised as the next level of AI systems. The concept of Theory of Mind is still in progress. These AIs can better understand the entities with which they interact. This is achieved by discerning their emotions, needs, thought processes, and beliefs (Haag & Eckhardt, 2014).

Self-Aware AI

These involve AI systems that can point where they are comparable to the human brain in terms of their development of self-awareness. This stage exists only hypothetically and recognised as the final stage of AI. It is also recognised as the ultimate ambition of all AI research.

Second Classification

The three subclassifications of second-degree AI are ANI, AGI, and ASI. This classification involves AI with a technology-oriented approach.

Artificial Narrow Intelligence (ANI)

This type of artificial intelligence represents all existing AI. ANI is also called weak AI, and ANI is what the world is experiencing today. ANI possesses a narrow range of capabilities, and the functionality of these machines is based strictly on what programs they are designed to execute. Also, the ANI responds to the limited memory and reactive machines AI functions (Xie et al., 2016).

Artificial General Intelligence (AGI)

AGI is defined as the class of AI that possesses the ability to perceive, learn, function, and understand wholly like a human being. Since ANI is associated with a problem-solving approach, AGI is linked with the ability of a machine to perform general intelligent actions. AGI is referred to as strong AI, as it includes machines that exhibit human intelligence.

Artificial Superintelligence (ASI)

The peak of AI research is associated with the development of ASI. The main objective of researchers and scientists involved in the development of ASI is to develop a machine that possesses higher cognitive functions as compared to humans. Our way of life will be considerably changed with the development of ASI (Hashimoto et al., 2018).

These two significant classifications of AI offer two ways in which we can understand both a practical application of AI and then its relationship to us as humans. While these two categorisations have two distinct 'outlooks' on the development of AI, they are both very much interrelated. Identification of advantages of AI is necessary to gain insights into its wide range of applications.

1c) Benefits of AI

Davenport (2018) argues that AI introduces automation for the business model, thereby taking analytics to the next level thus enabling the development of both new products and the organisation's ability to enhance the features of existing services and products. AI integration in product and service improvement operations accelerates the product development cycle, which provides increased competitive advantage to the business. According to the findings of Purdy and Daugherty (2016), a significant impact has been made on business with the recent

developments in expert systems, machine learning, speech recognition, natural language processing, robotics, and deep learning. Regarding these developments, AI has emerged in the business world to improve organisations' decision making and re-creation of the current customer experiences. These beneficial aspects have been highlighted in the research of Gartner (2017). According to Gartner (2017), in numerous fields and industries, AI has become an active area of research including education, engineering, business, accounting, economics and law, marketing, finance, and medicine. The prospects of AI are already applied to endeavours such as healthcare, new media, and self-driving with reports still being published on the exploration of additional areas AI may cover in the future (Bollier, 2017). Currently, significant competitors in the AI industry include Amazon, Microsoft, Google, Apple Facebook, and IBM, which are efficiently competing to gain advantages and more significant market share by leading the advancement of AI in industrial sectors (Purdy & Daugherty, 2016).

The role of AI has also been evaluated and recognised as significant in the economic growth of countries such as China, the US, and India. According to the report presented by Vempati (2016) by 2030, the potential contribution of AI in the organisation will lead to increases in the global economy by 14%. With the introduction of AI in the work setting, the labour of employees has been reduced while cost and expense on them are also reduced, ensuring maximum savings to the company (Gartner, 2017). The use of AI has, therefore, positively influenced each area of life of people and businesses alike, while the economic impacts are significant.

Research has identified a wide range of advantages associated with the use of AI (Mane, 2014). Achievement of better accuracy as the probabilities of errors with AI is almost nil. The organisation saves the costs associated with human resources with the use of chatbots, which

efficiently interrelate with customers (Brock & von Wangenheim, 2019). The speed of machines employed for specific functions is comparatively faster than by employees. The use of AI also confers precision and accuracy in the work with limited use of manual interventions (Brynjolfsson & Mcafee, 2017).

Subsection 2: AI Adoption

2a) Pioneer Adopters of AI

Pioneers can be defined as the organisations that possess an extensive understanding of AI concepts and tools and achieved significant levels of AI adoption. Although investigator organisations understand the concepts of AI, their adoption prospects are limited. While in the case of the experimenter organisations, adoption is significant but with limited understanding. Finally, passive organisations have limited understanding and adoption of AI (Brock & von Wangenheim, 2019). Thus, among these companies, pioneers are the early adopters with a highly practical understanding of AI concepts and significant adoption levels. The reports of a global survey by "Boston Consulting Group" concluded that in the adoption of AI the business conducts, the barriers identified are in execution and ambition (Büschgens et al., 2013). According to Ransbotham et al., (2017), 80% of companies, which mostly included multinational and large-scale companies, favoured the adoption of AI as they claimed AI provides competitive advantage while 40% of companies had an ongoing strategy into the adoption of AI. The proportion of companies favouring AI adoption indicates an awareness of the benefits AI may impart to the business is not limited, and a majority of firms believe in the beneficial impacts the company may gain with AI adoption. Ransbotham et al., (2018) also conducted a follow-up survey in which it was demonstrated that the pioneer adopters were increasing their AI

investment, which further led to the expansion of the adoption gap between other firms. The strategy implemented by pioneers, the early adopters of AI, is positioning and structuring their firms to gain more extensive benefits from AI (Davenport, 2018). As pioneers adopt AI and reap the benefits, they dominate and take control of markets by using AI as a tool of business expansion. The employment of AI as the solution to organisational problems was identified as useful by leaders in pioneer companies (Tidd & Bessant, 2013).

Furthermore, early adopters of AI are also focused on the prioritisation of revenue-generating applications over cost-saving applications. According to the report provided by Ransbotham et al., (2018), 72% of pioneers supported AI as they claimed it would increase revenues while 28% of pioneers had the expectations of cost savings. Thus, as part of their strategy, early adopters are using AI to develop revenue-generating applications over cost-saving. This is further demonstrated by cybersecurity companies that leverage an AI-backed algorithm to deliver security incident and event management (SIEM) to its consumers at a competitive price (Pearce, 2019). Additionally, in a recent survey, efficient adoption, implementation, and understanding of AI were adopted only by 20% of pioneer companies (Xie et al., 2016). According to Johnson (2019), more aggressive investments are being made by the AI pioneers, and the organisations are reported to undergo a greater focus on business model transformations with AI. However, the shortfalls with AI pioneers are recognised to be associated with unclear business cases and a lack of technical capabilities. The difference also lies in the companies' approach to AI adoption for cost reductions over revenue enhancements (Anandhi Bharadwaj et al., 2013).

Despite the challenging measures, pioneers not only believe in the revenue-generating potential of AI but also expect the full range of opportunities AI adoption will provide to the

organisation (Haag & Eckhardt, 2014). Assessment of requirements of AI adoption is necessary to identify the factors that affect AI effective adoption.

2b) AI Adoption Requirements

Most organisations possess rich yet disorganised and incomplete data, which is considered an essential prerequisite for AI. It is expected that an organisation requires accurate data for AI, which is generally a misassumption. However, a key constraint encountered by the organisation is access to specialised data sources (Alsheibani et al., 2018). The requirements for AI in the organisation must initially be identified to collect and organise accurate data for AI integration. Research has highlighted that open datasets are provided by the government as open data initiatives, as well as by researchers and non-profit organisations (Awa et al., 2017). AI adoption in the organisation is, therefore, dependent on the presence of comprehensive datasets that are accurate and valid (Hashimoto et al., 2018). Redman (2019) states that incomplete datasets and poor data quality place an additional burden on data scientists who then have to compensate by manually cleansing the data. This process is time-consuming and doesn't correct all errors. The challenges and requirements of inaccessible and incomplete data are recognised to be overcome through the increasing availability of data science products. These products substantiate the requirements of datasets by the algorithmic organisation and data supplementation. Also, a "trained off-the-shelf AI model" is proposed, which can be used as a component enhancing organisational capabilities (Cao et al., 2013).

Engagement with AI technology is a crucial aspect that must be reviewed by the organisations' policymakers and technology implementers. Experimenters and investigators differ in this aspect (Brock & von Wangenheim, 2019). Organisations are required to investigate

which operations need scaling up initially and enhancement before the adoption of AI. Among the group of firms, investigators are the companies that promote education and research among the employees, increasing their information regarding AI systems and associated technological capabilities. However, due to inefficient identification of requirements, these companies have not run tests or experimented concerning the need for operations demanding to scale up (Osoba & Welser, 2017).

In contrast to investigators, experimenters lack the understanding of AI functions and operations while they are the smallest groups learning by doing. With an unfortunate lack of understanding of AI adoption requirements, experimenters are in a continuous state of experimenting in controlled conditions (Vempati, 2016). Concerning the requirements of AI functions and concepts, passive organisations possess no firm strategy neither in experimentation nor in investigation phases (Davenport, 2018). These organisations lack the proficiency to identify the areas which need scaling up or areas that can be improved through AI adoption. These groups of investigators, experimenters, and passives differentiate the perspectives of requirements of AI adoption based on understanding AI concepts and its application or practice use through adoption (Haag & Eckhardt, 2014). Investigators and experimenters implementing AI fail to comply with the requirements of AI, which leads to the failure of these companies in the effective adoption of AI. Several examples are presented in the literature, which includes the digital transformation of Danish shipping company Maersk which is categorised among the pioneers adopting AI. The idea of AI and the practicality of AI are not the same thing as the implementation and adoption of AI. It is a comprehensive process that requires organisations to initially develop a detailed understanding of the AI concepts and its implications in a business context (Ransbotham et al., 2018).

Organisational culture also plays a significant role in identifying the requirements of AI adoption. Organisational culture can be defined as the environment or culture maintained within the organisation based on beliefs, values, customs, and traditions of employees and employers (Brock & von Wangenheim, 2019). A technology-oriented organisational culture is recognised as most supportive in the adoption of AI, which also facilitates the areas of the enterprise that require scaling up through technology. Ivanov and Webster (2017) state that a corporate culture developed to promote innovation and technology adoption is ideal for the adoption of AI regardless of the industrial sector the organisation serves. Literature also presents recommendations for the organisations willing to adopt AI, in terms of its requirements, to improve the organisational performance and productivity (Ransbotham et al., 2018).

2c) Challenges in AI Adoption

AI adoption in an organisation is influenced by the barriers the adoption measures encounter. Researchers have identified a wide range of barriers that are encountered by IT professionals in organisations that lack innovative approaches and prevent investments in technology integration in the organisation (Mane, 2014). Lack of understanding of AI concepts is the most common barrier, generally identified among experimenters. These organisations tend to lack the skills and resources that lead to an understanding of AI operations and concepts. This results in limited beneficial impacts of AI in experimenter organisations (Johnson, 2019). Lack of understanding of AI falls under two categories. Firstly, the organisation may lack the skills to match a suitable AI solution for a business problem. An inaccurate AI-based solution for a business operation issue can fail the objective and also result in a loss of financial resources. Secondly, the application of incorrect assumptions can limit the scope of applied AI solutions. AI

solutions must then be provided by outsourced consultants who may ensure the reliability of the proposed AI solution. Both challenging situations are generally observed in the experimenters, which result in limited efficiency of the AI approaches they apply in the organisation (Osoba & Welser, 2017).

Another significant barrier associated with the adoption of AI is the lack of effective strategy or data that may enable the firm to gain relevant and complete information about its customers. This issue has been highlighted in the research of Chui et al., (2018) and Ransbotham et al., (2017). Such barriers also reduce the efficiency of organisations in obtaining the information of customers, regarding their demands for the product or services, or how they consider the image of brand among other similar organisations. Lack of an adequate amount of data is a significant barrier in the effective adoption of AI as it prevents the organisation from entering the initial stages of AI adoption (Khan et al., 2010). This barrier can be overcome through the use of IT products and outsourced service providers that may ensure an adequate amount of data for AI adoption by the algorithmic organisation and data supplementation (Haag & Eckhardt, 2014).

Accuracy of the algorithm to be used for AI is also recognised as one of the prominent barriers in organisations willing to adopt AI in their operations (Awa et al., 2017). At present, businesses have much less flexibility concerning the customisation of AI software, which reduces their efficiency of applying any additional algorithms for AI. The expertise of AI software providers is necessary for the organisation to develop and apply accurate algorithms unless the company develops its own AI in-house (Haag & Eckhardt, 2014). This barrier can be overcome by outsourcing the algorithm development for AI. Although AI software service providers charge for the development and application of accurate algorithms, this may reduce the

risks of inaccurate algorithm application, which has several disadvantages in long the run, such as inefficient organisational goals achievement and project failures (Brynjolfsson & Mcafee, 2017).

The shortage of data scientists is recognised as a significant barrier to AI adoption for organisations willing to adopt AI. Lack of professional expertise to develop, integrate, and operate the AI function reduces the chances for the organisations to gain competitive advantages over their rivals. This has also been highlighted in the publication of Phaphoom et al., (2015). The study investigated the significant barriers to the adoption of cloud services in organisations. According to the findings and in addition to the lack of professional expertise of data scientists, organisations are also challenged by the barriers of AI adoption, data privacy, security, and portability (Tidd & Bessant, 2013).

Subsection 3: Organisational Support

3a) Organisational Support for AI Adoption

For AI adoption, organisational support plays a critical role. The support provided by the organisation identifies the conditions and factors of innovation, integration, and adoption. Consequently, as more organisational support is available, additional opportunities are presented to the organisation's success and growth, implemented and facilitated by AI adoption (Brynjolfsson & Mcafee, 2017). Organisations assessing the demands of employees in various business operational units address the needs of scaling and improvement through AI adoption. Additionally, the progress and success rate of the organisation is reported to be directly dependent on their perspectives of innovation adoption and response to the challenges through technology integration (Ransbotham et al., 2018). Digitalisation is a recently introduced

approach, promoted through organisational support. Digitalisation ensures that the organisation is keeping pace with the current technological demands of the firm and responding effectively to the environmental changes. Organisations' progress and success is a critical evaluation parameter and factor that determines the effective use of AI to transform the core parts of the business. Increasing rates of digital transformation and AI adoption have been reported in pioneer organisations, including Danish shipping company Maersk that has augmented digital transformation through AI. These digitally transformed organisations efficiently address the needs of business functions through AI. The chances of investments are increased when organisational culture supports AI adoption, which further promotes the efficiency of AI in the business functions (Xie et al., 2016). It can be argued upon that investment chances, positive organisational culture towards AI, and the efficiency of AI function is a cyclical endeavour that has the potential to continue to gain rewards. Challenges of a shortage of professionally skilled individuals to adopt AI cause hindrance in the enactment of organisational policies that promote the use of AI in the firm. Pioneer organisations managed to resolve these challenges by employing multiskilled individuals in the firm that enabled effective adoption and implementation of AI (Hashimoto et al., 2018).

Lack of sufficient organisational support in AI adoption is recognised as a significant barrier to AI adoption. This lacking might be contributed by a non-technology oriented organisational approach and obsolete organisational policies directing the business functions (Brock & von Wangenheim, 2019). Employees lacking expertise and skills to operate AI functions and poor understanding of AI concepts might fail to promote organisational growth and success despite an innovation and technology-oriented culture of the organisation (Awa et al., 2017). Employee performance and skills, therefore, play a significant role in terms of

organisational support to promote AI adoption in the company. Furthermore, policymakers using non-technology-oriented approaches in designing and implementation of the policies in the organisation may restrict the effectiveness of organisational support in promoting AI adoption (Khan et al., 2010). This parameter has been identified as a significant challenge for organisations which support more significant investments in AI integration in the business functions and systems. Finally, an inadequate managerial approach towards AI adoption reduces the chances of effective adoption and implementation of AI in the company (Haag & Eckhardt, 2014). IT managers play a critical role in addressing the requirements of business functions that need scaling up through AI adoption. Managers lacking the efficiency to manage the needs and requirements of employees as well as business functions that need improvement through AI, decrease the chances of practical implementation and adoption of AI in the organisation (Büschgens et al., 2013). For the organisation, identification of intrinsic barriers is crucial for the assessment of effective AI adoption.

3b) Intrinsic Barriers to Organisational Support for AI Adoption

To better manage their business functions and customer experiences, many organisations are approaching AI adoption. However, a range of intrinsic barriers is identified to affect the organisations' approaches and efforts to AI integration and implementation (Miller, 2019). One significant internal barrier organisations face is a lack of access to skilled talent. The barrier to access AI and data science expertise and skills are recognised as the top barrier in organisations willing to effectively implement AI for improvement of their business functions and customer experiences (Awa et al., 2017). Furthermore, a survey-based report indicates that organisations lack necessary in-house skills to execute the AI strategy, which results in a restricted application of AI functions in the firm. Ransbotham (2018) states that a significant lack of internal skills has

been identified, which limit the execution of AI-associated projects. Manufacturing and IT are reported as the most significantly affected areas that encounter the shortage of necessary in-house talent. To overcome the challenge of a lack of internal skills for AI execution, companies utilise outsourcing strategies that have been recognised effective in promoting AI adoption. Also, this resolving strategy is widely adopted by technology-oriented companies that lack the internal workforce for the effective implementation of AI (Haag & Eckhardt, 2014).

Other significant intrinsic barriers that prevent organisations' approaches to AI adoption are lack of access to necessary technologies and tools, an insufficient budget, insufficient collaboration among different teams, inadequate or lack of access to essential data, and reduced executive sponsorship (Hashimoto et al., 2018). Lack of access to necessary tools and technologies reduce the scope of companies in addressing their internal issues such as poor business operations, reduced efficiency in achieving organisational objectives, and lack of resources from where these tools and technologies can be collected (Johnson, 2019). An insufficient budget is the primary internal challenge that reduces the efficiency of an organisation to implement AI effectively. Lacking sufficient investment in technology is the primary cause that prevents the hiring of skilled personnel, the purchase of practical tools and technologies, and the AI software purchase (Miller, 2019).

Business units are recommended to work collaboratively to ensure inter-departmental support for the adoption of AI functions. However, inadequate supportive measures provided by the leadership team members or poor collaboration amongst cross-functional teams are reported to result in poor application development of business models that inefficiently promote AI integration (Osoba & Welser, 2017). Essential datasets are also necessary for organisations willing to adopt AI. However, for this purpose, a comprehensive understanding of AI concepts is

crucial and must be entertained by organisational employees. Lack of understanding of AI

concepts, as well as lack of access to the essential datasets for the AI functions to operate

effectively, has resulted in the poor adoption of AI in organisations (Vempati, 2016). Moreover,

specific internal barriers are enhanced by the presence of poor sponsorship that lacks the

proficiency to identify the areas which need improvement. Thus, despite substantial support and

effort of organisational policies and workforce, poor sponsorship reduces the scope of AI

adoption and its practical implementation (Xie et al., 2016).

3c) Meeting Organisational Objectives with AI Adoption

AI and its use in business have increased exponentially due to the advantages and

opportunities it provides to the organisation. Machine learning processes are complex, and the

development of their understanding is recognised to efficiently promote AI adoption in the firm

(Hashimoto et al., 2018). The natural language processing and machine learning development

have led to a rise in the popularity of AI in the business models while also enhanced the

strategies used by firms to understand AI concepts on more full planes. With the effective

adoption of AI, organisations have demonstrated adequate progress in meeting the objectives at a

fraction of time and costs. Different factors make AI an ideal platform to promote the

achievement of organisational objectives (Anandhi Bharadwaj et al., 2013). The use of AI in

developing countries is undervalued, which can be linked with socioeconomic factors. These

challenges must be overcome through the development of policies that support the AI adoption

in business functions and the development of business models that automatically include AI as

an intrinsic factor in operations (Davenport, 2018). With AI, firms are capable of active short-

term goals with the fulfilment of skilled tasks such as trading stocks and shares, news article

writing. Undertaking case research for legal firms and in the gaming and entertainment industry (Brynjolfsson & Mcafee, 2017).

Sustainability strategies are among the fundamental objectives of the organisation, which is ensured through the utilisation of sustainable business functions and operations. AI-based business operations ensure sustainability and increased productivity, improving organisational performance in the long run (Brynjolfsson & Mcafee, 2017). Also, the functions of marketing activities and increasing sales at exponential rates. Personal assistants and chatbots have already promoted to integrate a cost-effective, user-friendly customer experience model in the run of customer-facing technology (Haag & Eckhardt, 2014). Organisational objectives are also associated with enhanced customer experiences, improved quality of products or services, and increased sales and revenues yearly. AI efficiency in covering these tasks has led to the development of organisational approaches that directly address the functions of customer service provisions, quality enhancement and sustainability, and management of sales and revenues' records while ensuring improvements on a large scale (Osoba & Welser, 2017). Additionally, organisational support provided to improve and update the AI functions and operations is intended to increase the chances of achieving organisational objectives at a rapid rate while improving the business operations that are being addressed by the AI functions (Gobble, 2019).

Three fundamental capabilities that are required to be relied upon include real-time insights delivery, data unification, and business context. These fundamental capabilities also address the successful adoption of AI. Real-time insights delivery provides grounds for the organisation to adopt AI through the accurate application of accurate algorithms. Data unification facilitates the integration of AI software and simplifies the process of AI adoption. Assessment of business context in terms of organisational culture and innovation approaches

enhances AI-based solution enactment under suitable and relevant categories (Osoba & Welser, 2017). AI has made the data unification simpler as most of the staff time is consumed in the practice of manual gathering of data sources. Data unification aims to gain insight into behavioural analytics (Büschgens et al., 2013). Budget allocation is another time-consuming task to which finance department employees are required to perform. The use of AI services in the budget allocation has not only resulted in the improvement in this function but also resulted in minimisation of errors while manually allocating budgets (Tidd & Bessant, 2013).

Subsection 4: Innovation Culture

4a) Innovation Culture and Organisational Culture Theories

To address the relationship between innovation culture and organisational culture, control theory is identified to explain their prospects. Clan control describes the coordinative effect while culture describes the ideational aspects of organisational values. According to the "Competing Values Framework," managers in the organisation may choose different clan control strategies. Employees that have efficiently internalised the organisational values apply the control theory in the form of self-control measures (Osoba & Welser, 2017). Büschgens et al., (2013) state that organisational culture and innovation approaches are significantly linked to theoretical planes that identify innovation culture as an integral part of organisational culture that follows and implements contemporary business models. Also, the study identifies control theory, which links the organisation culture with innovation. According to Xie et al., (2016), literature proposes that "organisation innovation culture" refers to the synthesis of attitudes, values, ideas, and beliefs within the organisation. These prospects intend to reward the innovation, engage flexibly with the complex environment, and encourage risk-taking attributes. The findings of Xie

et al., (2016) also state that there are positive relationships between organisational innovation atmosphere, knowledge sharing, team decision making, innovation performance and organisation change. In all these aspects, a decisive moderating role is played by the team cohesion in promoting the organisational innovation culture (Alsheibani et al., 2018).

Insights presented by Naranjo-Valencia and Calderon-Hernández (2018) on theoretical aspects of organisational culture and innovation culture provide broader perspectives in addressing the factors that act as moderators and influence the relationship between the two. According to theoretical behaviour aspects discussed by Naranjo-Valencia and Calderon-Hernández (2018), acceptance of innovation is reflected by the employee behaviour as the fundamental organisational value. Acceptance of innovation and innovative culture encounters less hindrance in an organisation that is comprised of highly committed and motivated employees (Davenport, 2018). To maintain competitive advantage, academic and theory-based recommended approaches emphasise the support and adoption of innovative culture in the organisation. According to Dodge et al., (2017), to create new products and services, organisations must keep pace with the extrinsic and intrinsic pressure. This pace is maintained through innovation culture for long term growth and achievability of vision. Innovation culture adoption also ensures firms to strengthen their operations and functions at a higher speed to compete with the challenges among competitors (Sadegh Sharifirad Mohammad & Ataei Vahid, 2012). The core findings of Dodge et al., (2017) indicated the role of three types of leadership that affect the organisational culture's impact on the adoption of innovation. These included leadership that ensures challenging work, leadership that provides organisational encouragement and leadership that foster support within the workgroup (Khan et al., 2010).

4b) Impacts of Organisational Culture in Innovation Adoption

Organisational culture plays an essential role in impacting the efficiencies of the organisation to adopt innovation. In addition to the leadership theories that promote integration and adoption of innovation in the organisation, the cultural values and beliefs implemented in the organisation have a role in promoting or discouraging the adoption of innovation (Awa et al., 2017). Among the various determinants, the key determinants of innovation identified by Shafie et al., (2014) are learning and knowledge sharing. According to the research of Shafie et al., (2014), the impacts of knowledge sharing on innovation adoption are positive, and organisations promoting knowledge sharing are observed to enhance their competitive advantage and operational performance (Tidd & Bessant, 2013). The adoption of technology in the organisation is also influenced by data management, innovation, leadership, and agility. In all business sectors, technology adoption has made a transformational impact, regardless of the type and nature of organisational culture. Additionally, current prospects of technology adoption using AI are intended to be utilised to expand the business by enhancing services or product offerings of the brand (Brynjolfsson & Mcafee, 2017).

Innovative culture has been reported to be influenced by four dimensions at the organisational level, which include adaptability, consistency, involvement, and mission. These dimensions have been focused on by "Sadegh Sharifirad Mohammad and Ataei Vahid" (2012), drawing the link between innovation and organisational culture theories. To develop a mindset or an innovation within an organisation, innovativeness and consistency are required, which directly influence the internal governance mechanisms and develop the innovative mindset via consensual organisational support. Innovativeness and consistency are claimed to encompass the core values, coordination, agreements, integration, and develop a mindset with an organisation

(Davenport, 2018). Also, it clears the set of expectations and creates a sense of identity among the employees, reconciliation with differences, and the ability to reach mutual agreements on critical organisational issues (Gobble, 2019). Other factors that have been identified in the literature that address the adoption of innovation and organisational culture aspects that influence the decisions of innovation adoption are employees perceptions of innovation adoption, degree and nature of likely organisational changes, employee-employer relationships, workforce capabilities, and efficiencies, and the core values and customs that may or may not favour the innovation adoption. Pioneer organisations promote innovation adoption in their organisational culture through risk learning attributes while expecting a range of positive attributes the organisation will gain after adoption (Khan et al., 2010). They promote the culture of risk learning, error-prone stages, and experimentation to create and embrace change. Consistency amongst leadership and workforce in responding effectively to changes during the stages of innovation adoption also displays the competitive characteristics an organisation has gained in responding to the challenges (Ransbotham et al., 2018). Assessing the organisation culture and innovation models may highlight the patterns of final AI adoption.

CHAPTER 03: METHODOLOGY

Introduction

The chapter discusses the methodology adopted for this study for data collection and analysis. The chapter has been structured in a way that follows the topics research philosophy, research design, method and analysis, data analysis, research instrument, limitations of the study, and ethical concerns.

Research Philosophy

Interpretivism research philosophy has been selected for this study as the research approach is qualitative. Interpretivist research philosophy is generally based on the principle under which the researcher explores the social world by performing a specific role in its observation (Kroeze, 2012). The research using interpretivism philosophy is based on the criteria that what are the intentions of the researcher and their interests (Ryan, 2018). An interpretive approach uses diverse methods such as observations and unstructured interviews, and this approach is much more qualitative; one of the reasons for which interpretivism philosophy has been used in this research (Ryan, 2018). Use of interpretive philosophy is adopted as it provides the opportunity of in-depth evaluation and use of qualitative assessment technique. Also, since the research is using interviews as the data collection instrument, interpretive philosophy is recognised most compatible as it involves qualitative interpretation of data collected via interviews. Interpretivism philosophy believes that individuals are complex and intricate (Ryan, 2018). Also, this research aims to qualitatively assess the literature as well as interview transcripts for which interpretivism is identified as the most accurate philosophical approach, involving human interest, experience interpretation and extraction of subjective conclusions.

As exemplified in the literature review, the organisation consists of people, and people make decisions. This research will attempt to understand the decision-making role that people in the organisation have in defining the innovation culture and the adoption of those innovations. Thus, a qualitative approach with interpretivism philosophy would be deemed appropriate. This approach is suitable as highlighted by Saunders et al., (2015) who states that the 'researcher would need to make sense of subjective and socially constructed meanings in regard to the subject being studied'. Based on the literature review and analysis of research methodologies used by subject matter experts such as Schedler et al., (2019) who conducted thirty-two semi-structured interviews on the drivers and barriers to innovation adoption in the government sector. This study identified drivers and barriers at the organisational level in the adoption of technology efforts with a focus on the innovativeness of the culture and organisation. Additionally, the study by Dobni C. Brooke (2008) investigated innovation culture in the organisation as a means of delivering competitive advantage and differentiation to deliver value.

Research Design

This study proposes to investigate the relationship between the adoption of technology and innovation culture in the organisation. The study design attempts to answer what factors in the organisation drive innovation and its subsequent adoption in Ireland. Primary research design provides the researcher with the opportunity to collect data on their own (Driscoll, 2011). Furthermore, interpretivism research paradigm has been employed in the research where interviews have served as the primary method of data collection. Interpretivism paradigm in this research assisted in the integration of the researcher's interest. Interpretivism approach is recognised as the most compatible approach for this research, given the requirement of analysis

of organisational culture and innovation. Applied research design with interpretivism philosophy is also compatible with the experiential evidence gathered in this study. A review of literature has also facilitated in identifying effective research design and approach for the assessment of the importance of organisational and innovative culture for AI adoption.

Additionally, this research design has the least bias integrated into it (Driscoll, 2011). Selection of primary research design for this study can be linked with the justification that by using primary data, the influence of organisational and innovative culture on AI adoption can be elaborated and can be studied in detail. Also, primary data is relevant, up-to-date, and specific to the research objectives (Driscoll, 2011). Primary research design provides a competitive edge, and the competitors may have no access to the data (Driscoll, 2011).

Primary research design has several advantages, and its application is generally linked with the researcher's data collection strategies (Bortnic et al., 2019). Most common data collection strategies employed by the researchers in primary research design include surveys, interviews, focus groups, and observations (Bortnic et al., 2019). Use of primary research design is also linked with the selection of the most effective data collection method under which the experiences of the targeted population can be evaluated. With primary data, the researcher would be able to address the needs of research objectives in this study by employing primary research design.

Research Approach

The qualitative research approach has been selected for this research as this approach is widely employed by researchers in assessing the experiences of a targeted population. The qualitative research approach is generally employed for the analysis of the experience of a

particular group (Lambert & Lambert, 2012). The approach is more focused on descriptive narrative while for the researchers more accustomed to the traditional deductive approach; qualitative research can be a challenging task. The descriptive narrative would provide an opportunity for the researcher to identify the aspects associated with innovation culture and AI adoption, in relation to the experiences and knowledge of professionals from a targeted population. Contrary to the prospects in quantitative research, in which the researcher is focused more on a collection of empirical data, development of hypotheses and testing them; qualitative research utilises an inductive approach within which the qualitative research approach derives explanation from the data (Maxwell, 2012). A Qualitative approach has been selected for this research as it is exploratory in nature, intending to explore the implications and prospects associated with AI adoption and innovation culture, via interpretation of experiences of professionals in an organisation.

Also, qualitative data through interviews have been collected, which requires the application of a qualitative approach. This strongly links with the needs and objectives of this research, intending to evaluate the qualitative meanings and patterns for the analysis of the effects of an innovation culture and AI adoption.

In a qualitative research approach, various data collection strategies are employed (Lambert & Lambert, 2012). These include observation or filed research. In-depth interviews are also used as an effective strategy of data collection in the qualitative approach, providing the opportunity to the individuals in sharing their perspectives (Maxwell, 2012). Interviews also enable the researcher to collect descriptive data on the phenomena of interest. Interviews can adopt any style; they can be either free-flowing like a conversation or can be highly structured (Maxwell, 2012). In most researches, qualitative research employs inductive logic within which,

the potential of understanding of a phenomenon is derived from the data. Furthermore, the techniques used in the data analysis in qualitative approach also promote an in-depth evaluation of the data (Lambert & Lambert, 2012).

Research Instrument

The researcher has selected two distinct approaches as a research instrument. The research employed a single case study approach, focusing on the National Transport Authority (NTA). Case study approach has been widely employed in qualitative research, intending to assess the experiences of the targeted population of individuals serving at the National Transport Authority (NTA), which provides governance to Ireland's transportation network. This organisation has been targeted in this study as it has gained significant place and reputation as a digital transformation leader in Ireland's public sector. By assessing the modes and technologies adopted by NTA in terms of AI, the prospects of AI can be highlighted and reported. Furthermore, this can also develop an understanding among the readers about technological adoption requirements within the public sector in Ireland.

The research methodology has also adopted interviews which were conducted telephonically with GoToMeeting and recorded. Recorded interviews were then saved and transcribed using Otter. Semi-structured interviews have been selected as the method of data collection as they provide the researcher with an opportunity to discuss in detail with the interviewees and evaluate their experiences. Execution of qualitative research studies widely employs Semi-structured interviews.

This research will use a single case study approach with the National Transport Authority (NTA), an Irish government agency providing governance to Ireland's transportation network.

With government agencies traditionally behind the innovation curve, the NTA is seen as a digital transformation leader in an Irish context. An inductive research approach in this study allows for the "theory to be developed through the observation of empirical reality; thus, general inferences are induced from particular instances" (Collis and Hussey p.342, 2014). Semi-structured questions will be employed with a thematic approach, drawing upon the literature to inform the themes. People make innovation culture and the decisions to adopt the technology. People make decisions derived from their own experiences, culture and influences. Hence the inductive approach would be deemed fitting to understand why people make specific decisions and the motivators and variables that drive them.

Target Population and Sampling Strategy

The target population selected for this research included the head of technical functions and senior leadership at the NTA. The target population included the technology leaders and senior executives in the NTA. The convenient sampling strategy was employed for the selection of participants for the study. This sampling approach enables the researcher to select the participant population-based on the feasibility of access, communication and approach.

Research Sample

Five participants were selected for the interviews. These included professionals in the NTA serving as senior executives and technology leaders. Selection and recruitments of the participants were finalised after approval of informed consent of each participant. The selection of participants provided insights in both practical and organisational experience with each participant in a position to affect organisational culture. Additionally, each of the selected participants had been influential in the adoption of technology, including AI within the NTA. All

the participants had more than ten-years experience, which ensures that their diverse and long-range experience would result in the identification of various prospects associated with the research topic. Selection and recruitment of five participants was due to limitation attributed by the global pandemic condition in reaching out to larger sample size. Also, due to time constraints, professionals in the NTA could not be approached. A larger sample size could be selected if certain limitations were not encountered.

Data Analysis

Thematic analysis has been selected for the study findings to conduct a qualitative analysis of the data collected through semi-structured telephonic interviews. The thematic analysis technique is widely employed in qualitative research which is generally applied to a set of text that is descriptive, for example, in the case of interview transcripts (Guest et al., 2011; Nowell et al., 2017). Justification for the use of thematic analysis in this study can be attributed to the narrative and descriptive data collected via semi-structured interviews. Thematic analysis has several advantages; one of the justifications for which it has been employed in the research (Guest et al., 2011; Nowell et al., 2017). For the development of themes, research questions in the interviews were focused, which are presented in the appendices. For the development of themes, scholarly evidence presented in the literature review was also assessed, and the key terms that were emphasised in the theme development included AI, NTA, AI adoption, organisational culture, innovative culture, employee performance, business functions, risks contributed by AI, and strategies and drivers.

Additionally, for analysis of the case study, interview research and data will be in note written form in conjunction with using "Otter" a voice recording and transcribing application. As

illustrated, the analysis will be conducted employing the five-step model developed by Yin (2014).
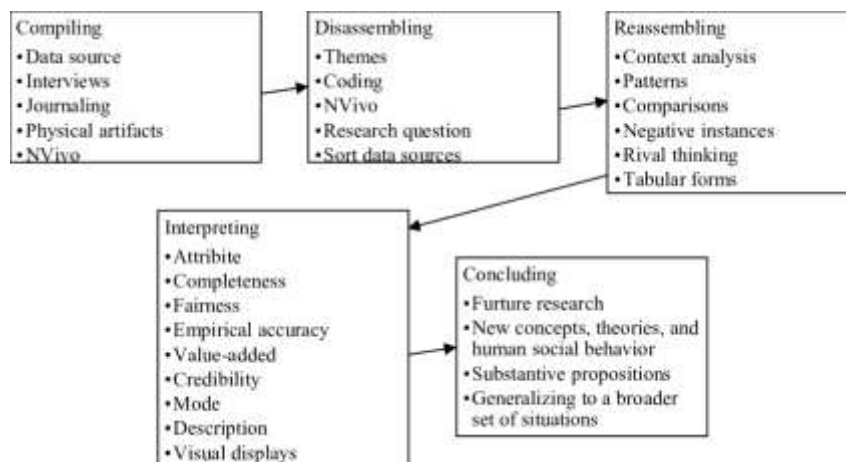
Figure 1: Data Analysis Approach Source: Yin (2014)

Limitations

Research methodology encountered certain limitations which resulted in narrowing down the scope of the study. Firstly, due to the Coronavirus global pandemic condition, the researcher could not conduct face-to-face interviews. Therefore, semi-structured interviews conducted telephonically with GoToMeeting was selected as the predominant method of data collection. Secondly, only free access articles were included in the study during the review of the literature due to the limitation of funds and investment as access to fee-based research articles was limited. Thirdly, due to time constraint, only primary research design with a qualitative approach was maintained. Mixed approach and quantitative analysis could also be selected, which might have enhanced the scope of the research by several-fold. Limitation of the participant sample also resulted in the restricted amount of data collection. A larger and more diverse sample size might have increased the study findings' scope. Limitations of this research are considered due to the

use of a single case study. Additionally, the researcher works with the NTA and in that regard may be subject to a certain bias.

Ethical Considerations

In order to ensure compliance with ethical standards, four essential ethical prospects have been reviewed and followed. These include the ethics of confidentiality, anonymity, beneficence and informed consent (Recker, 2012). Before the execution of this research project, each participant was required to complete the ethics form and informed consent so that their participation in the research was based on mutual agreement. During all interviews, no sensitive topics were explored, and the anonymity, dignity and respect of each participant were prioritised. The personal information of the participants was secured and kept confidential (Connelly, 2014).

Moreover, to ascertain the ethics of anonymity, each participant was assigned with a pseudonym. Compliance with ethical concerns is associated with high integrity and quality of research. Also, there are fewer chances of bias and conflict of interest in researches that follow the provided ethical compliance criteria (Connelly, 2014).

The researcher carried out this research project independently and impartially void of bias based on gender, race, religion or creed. Participants were treated with respect and professionalism. The researcher ensured subject respondents' confidentiality and anonymity. All participants participated voluntarily, and void of harm based on this research project. All data was be maintained on a secured, encrypted mass storage device. All data was subsequently destroyed after the appropriate time frame mandated by the National College of Ireland (NCI). The ethics form provided by the National College of Ireland was completed with honesty and transparency.

CHAPTER 04: FINDINGS AND ANALYSIS

Introduction

This chapter presents the analysis and findings. The chapter is divided into two major sections; the findings and the data analysis. Findings presented in this chapter is the data in the form of responses collected from five participants of the study. Data analysis has been conducted through thematic analysis strategy where the researcher implemented a structured strategy. The research methodology utilized interviews that were conducted telephonically with GoToMeeting and recorded. All recorded interviews were then saved and transcribed using Otter. This was followed by the identification of common themes and patterns in the reviewed data, which resulted in the formation of potential themes in the study. The further analytical section is presented within the themes and analyses the responses of the participants.

Thematic Analysis

Five potential themes have been generated, based on the responses of the participants. Themes generated upon analysis of the responses of participants are presented below:

- AI in Business

- Strategies and Factors to Drive Adoption of AI

- Organisational and Innovation Culture influence on AI

- Business Functions and Employee Performance

- Future Risks due to AI Adoption

Findings

Five participants were selected for the semi-structured interviews. Participant information is provided in table 1. Interview questions that were investigated are presented in Appendix 1. To protect the personal information of the participant, each participant has been assigned with a pseudonym, as depicted in table 1. Data analysis was performed as per Yin's (2014) strategy, i.e., compiling, disassembling, reassembling, interpreting, and conclusion

Table 1: Participant Information

Participant	Age	Experience	Gender	Occupation
P1	40+	15+	Female	Technology Leader
P2	40+	15+	Male	Technology Leader
P3	50+	10+	Male	Senior Executive
P4	50+	10+	Male	Senior Executive
P5	45+	10+	Male	Technology Leader

Q1: Perceptions of AI

P1 responded,

"I think there is a lot more of what could be classed as AI as in the business world than people realise. So even when you're looking at technologies and things like chatbots, which has swapped its name so, like a robot, people don't think this is artificial intelligence."

P2 responded,

"I think the role of Artificial Intelligence within the business world over the last years is changed quite dramatically. I think that perception has changed as well. I think, and if we look back 10 or 15 years ago, it was unknown constant."

P3 responded,

"I think it's a fantastic tool for any business, you can get a huge amount of time back. I see a benefit from using AI. It does a lot of things for you, anything human beings can do, but it does it far more quickly and far more efficiently. Especially with processing very large data sets is something that really can't be done by a human being, but AI actually allows it to be done very efficiently, both at the centre and at the edge so, I think it's actually something that is a maturing technology, and it's something that we're now embracing across a lot of organisations, and it caught on within our organisation."

P4 responded,

"I think there is still an element of confusion in my mind when people talk about AI, and they talk about machine learning. Are they talking about the same thing when we talk about both of those? Not sure and where I would see it coming up most often is in the analysis of massive amounts of data."

P5 was of a similar perception of AI as P3 and recognised it important for current business models.

Q2: Perceptions of Technology Adoption in The Organisation

P1 responded,

"Actually, I would say our organisation is not bad at adopting new technologies. We have a chat bot…. We also do quite a lot of machine learning, business intelligence,

business analysis, that sort of thing as well. Which is not going to entirely be AI but you're beginning to get there, especially on that machine learning."

P2 responded,

"It's changed. I am lucky that I'm sponsored by a director who is very clued into the technical advances in the technical improvements are being made all the time. He's willing to fight the cause for trying new things out and trying to find a use case for them. So, I think that's good. I think as a whole as an organisation there is a need that people know that data is important and that the acquisition of the data is important, but they're not focusing on that they're focusing on their day to day job."

P3 responded,

"in the NTA? Yes. I think the NTA has become a very technology-focused organisation over the last number of years. I mean, we are digital-first, cloud-first, and we've included that in the technology systems that support the public transport systems for the last number of years, a significant number of systems. So, I think technology is seen as kind of a key enabler to important services."

P4 responded,

"I'm in the NTA, a couple of years now, or less. And I think it's a remarkable organisation in terms of taking on a workload and investing in technology, investing in new ways of doing work. So, I would say we're really top class in terms of looking for technology solutions, and we're not a bit afraid to take on these large, disruptive technologies in the interest of doing things better, quicker, faster."

P5 also stated that

"for our current operation in the businesses, we were required to adopt technology to provide services to the public. The NTA is supportive of new technologies to provide that."

Theme 1: AI in Business of the NTA

From the analysis of participant responses, it has been highlighted that the organisation has efficiently adopted technology in its business functions which has resulted in directing the organisation. Likewise, as participants state, ways to enhance the use of AI in the NTA has resulted in the identification of a wide range of strategies that can be adopted by the organisation. The NTA has adopted an RPA robotic Process Automation which has improved the work functions. Participants indicate that with the integration of the Robotic Process Automation (RPA), a four-fold increase in productivity has been noted. AI has been recognised as being crucial as it is efficiently transforming the business activities by producing positive results on productivity and performance. One of the positive influences of AI has been made within customer relationship management systems. Heavy human intervention is required for the software to remain up to date and sustain accuracy, but AI intervention reduces the requirement of human intervention.

Most of the benefits associated with AI are also linked with customer experience, the findings of which have been supported by the evidence. One of the participants highlighted the associated benefits of technology adoption in the organisation, which resulted in improving the performance of the organisation several-fold. P3 also highlighted the implications of robotic process automation which result in improving the work efficiency and performance of the organisation. In addition to improvement in the work performance through the inclusion of AI in

business strategies, positive influence on customer experience, enabling companies to reduce the level of complaints from the customers' end (Brock & von Wangenheim, 2019).

All the three types of AI, as discussed in the literature review of this study, have been recognised important for companies that enhance their business capabilities (Anandhi et al., 2013). AI has been reported to improve the business efficiencies by supporting three important business needs; gaining insight through data analysis, automation of the business process, and engaging with the customers and employees (Alsheibani et al., 2018). AI is expected to create more wealth while the changes induced by the AI are assessed subliminally and overt (Moonen, 2017). With the inclusion of AI in business operations, companies may highlight the importance of investment in technological prospects. Findings of the study are supported by the evidence as most business strategies are now transforming their efficiencies and performance, being more productive through the inclusion of AI in business operations (Shrestha et al., 2019). Research has indicated the importance of the development of an organisational culture that substantially promotes the adoption and integration of AI and technology in the organisation (Moonen, 2017).

Q3: Strategies to adopt AI

P1 responded,

"There is a strategy where we are technologically forward-looking. So, cloud-first like many other companies. But also, where can we go forward to get where we want to go most efficiently. And efficiency isn't just money efficiency or people efficiency. It's also service efficiency as well."

P2 responded,

"I guess over the last two or three years we've been able to capture data and acquire data that has left us with more questions than answers. So, we've been able to capture

quite a large quantity of data, but not know what we can do with it now. The strategy that we've adopted is one of, I guess, build it, and they should come. And I think that's something that we've consciously done. The NTA is and has particularly come from the position of an engineering type background."

P3 responded,

"We kind of have to adopt AI by stealth in some ways, there was a lot of cynicism initially, from the business units as to what AI could deliver. We had to embrace it by doing several small kinds of innovation projects, like, proof of concepts and stuff, because the business didn't believe that there will be any benefit from AI and machine learning."

P4 stated,

"I think that there's been some I could use the word tinkering around the edges. I don't know much that I might be calling experimentation. Yeah, certainly explore, some piloting and, and some pretty good stuff done particularly around one or two areas. One was a trip chaining. So, we don't know when people get off buses, but we know when they get on."

P5 stated,

"The NTA has taken various strategies to adopt AI, including changes in their organisational framework. We acquire the data as much as we can into the data lake, and then we are using that data to produce some analysis."

Theme 2: Strategies and Factors to Drive Adoption of AI

Participants of the study were interviewed regarding the strategies that have been approached in the NTA for the adoption of AI. According to the response of P2, the organisation can capture large quantities of data and the long-term strategy for AI integration is recognised as not very well-formed. P3 was of similar idea stating that adoption of AI in the organisation has been ensured by stealth in some ways. Initially, the organisation had to face cynicism. P1 identified 'cost' as the major driving factor as the company has to look at the investment, budgets cost, and return. From the responses of the participants, it can be viewed that there is a wide range of strategies that can be focused by the company to adopt AI which might also be advanced by the factors to drive adoption of AI. Literature has highlighted various strategies that can be practised by organisations for adoption of AI. These include empowering the leaders, integrating AI with analytics, thinking automation, standardisation, collaboration, and being open to the options.

According to research, healthcare providers have struggled to identify the long-term benefits associated with AI (Fartash et al., 2018). Due to the lack of sufficient understanding of the strategies, healthcare organisations have also sometimes failed to capitalise on capabilities of AI fully. According to McCall (2019), a strategy is required to be put together by the government of Ireland to shape the future direction of adoption, development and implementation of AI. Thus there is a significant need for the development, identification and recognition of effective strategies at the organisational level in Ireland to utilise the potential of AI at maximum (Chanda, 2019). Certain factors have also been identified that either promote or demote the adoption of AI. Cost and budgeting have been identified as the major factor that promotes integration and its

adoption. According to Howley et al., (2012), modelling of different factors that drive the uptake of AI within a business sector can be an effective strategy for AI adoption.

Also, it may also equip the policymakers in the development of programs and policies that promote effective management through automation (Beyene et al., 2016). Three potential factors have also been identified by Smart Energy (2020), the three potential factors that drive an increase in the adoption of AI include employee efficiency, customer experience, and to accelerate innovation. According to the response of more than 50% of 2,056 lines of business decision-makers and IT professionals, adoption of AI is efficiently drove by customer experience (Boyd & Holton, 2018).

Analysis of the responses of participants in this study also indicated that the NTA is currently "tinkering around the edges" and performing "experimentation" for the adoption of AI (Al-Bahussin & El-Garaihy, 2013). Organisations are required to identify compatible and approachable strategies as well as effective driving factors that promote the adoption of AI. Among the various driving factors, customer experience is most important in addition to the costing (Tian et al., 2018).

Q4: Organisational Culture of the NTA In Support of Technology Adoption

P1 stated,

"Generally, yes. Yeah, as in every organisation, you've always got people who want to go faster than other people. And you will always have other people again, who are slow to adopt, but we've always done it this way. We're comfortable with doing it this way."

P2 stated,

"I guess it's fairly neutral. I don't think it inhibits it. I don't get the sense that culture prevents people from trying out new technologies. I'm not sure it's nimble enough for or can correct its course quick enough to take full advantage of technology, and I think that's a cultural thing. I think, again, going back to the idea that the NTA was born from an engineering background, that it's still a little way to go, to embrace technology to be able to deliver on its strategy."

P3 stated,

"the organization culture is predominantly a civil engineering culture at the moment where we look at building an infrastructure, networks, corridors, shelters. Over time actually, I can see that technology is being adopted more and the culture is changing towards technology. Particularly it brought information and analytics to the directors, and they begin to see that there is huge value in the technology."

P4 stated,

"We have two technical directors, and that would be very unusual to have a CIO, Director of transport technology on a small executive board. The size that it is will tell you that we're very pro-tech, and see the value of tech. We're a very technical organisation. Suppose you take, if you take the CIOs, entire complement of staff and the transport director, staff of about 70. All engineers all professionally qualified. That's a huge percentage of our organisation that is technical. Then take us, the infrastructure team, who are a lot of engineers."

P5 stated,

"The NTA has developed a culture where experimentation is allowed and promotes technology adoption in its business functions. I don't know if it's encouraged, but I certainly say it's allowed."

Theme 3: Organisational and Innovation Culture influence on AI

When identifying which aspects should be focused on in the development of effective technology-oriented organisational frameworks, the influence of organisational and innovation culture cannot be overlooked (Chang et al., 2017). As per the analysis of responses of the study participants, it has been identified that most business corporations are investing significantly in the updating of their organisational structures. According to Maher, (2014), the significance of organisational culture must be assessed by companies as organisational culture crucially facilitates or prevents the maintenance and implementation of innovation and technology within the organisation. Furthermore, the frequency and speed of innovation are also affected by the organisational culture. According to participants of the study, AI is beneficial for every type of organisation and employee understanding of the adopted AI technology is also important (Gaziulusoy & Brezet, 2015).

Innovation oriented organisational culture has been significantly promoted in the NTA. This type of organisational culture consists of innovative competence, innovation-oriented motivation, quality and style of management determining the climate of innovation, and behaviour in the innovative situation (Horowitz, 2018). According to the response of the P2, P3, and P5, the NTA has moved towards a cloud environment successfully, which has resulted in a significant level of innovation integration in the organisation. Economic and social knowledge, level of education and general management, ambition and the atmosphere of competition, a

system of communication implemented in the firm, incentive schemes, lack of arrogance, exchange of innovative ideas, announcing authors of success, and egoistic attitudes are some of the crucial factors integrated into the organisational culture that tend to influence the adoption of AI (Dwivedi et al., 2019).

Organisational culture plays an important role in promoting the integration of innovative culture as well as promoting the willingness of the employees in adopting the change (Horowitz, 2018). Organisational culture assessment for the integration of innovation and technology is necessary as it affects factors that can be focused by the policymakers in the organisation to develop innovative attitudes towards the challenges (Azar & Drogendijk, 2016). Research has identified that small and medium scale companies in the developing countries were intending to enhance their productivity increase their potential by simply borrowing from the shelf of technologies available to the world. According to a report presented by Real Wire (2020), approximately 76% of companies in Ireland have created an innovative culture which has been predicted to double the business growth in the coming years as compared to the competitors on an international level who have not approached innovative culture to the same extent (Ransbotham et al., 2017). Additionally, the same level of growth has not been predicted for 89% of Irish organisations with low innovative culture (Ransbotham et al., 2017).

From the analysis of the study participants' responses, it can be stated that with the inclusion of more technology and innovation-oriented approach in the organisational culture, various barriers and challenges can be prevented. P3 stated that innovation is the culture of the NTA, and the organisation uses a diversity of innovative strategies to address the needs of employees.

Q5: Impacts on Employee Performance In the NTA

P1 stated,

"specifically, on an employee impact, because much of the other things that we have are service-related so that they would impact the customer or they would impact other consumers of the output of our data, for example, so on the machine learning…"

P2 stated,

"At the NTA is interesting. It's enabled employees to focus more on the value-added work they can do. So, for instance, if we look at the alighting issue that we have, there was a lot of effort and time being spent by employees trying to estimate where people are getting off their buses. So, we have a tag on we don't have the tag off information, so knowing where people get off their buses is a bit of a black art."

P3 answered,

"Well, there's no doubt that when you can apply machine learning or AI to things, things can be done far more quickly. I'll just give you one or two examples, in terms of the boarding and the alighting use case, the previous way of doing that was to have a very large spreadsheet that administered flowtime by one person. It was taking that person months just to get it ready to be used. Now we've passed the information into the data lake and machine learning environment. What was taking weeks and weeks is now taking days."

P5 stated,

"There will be a significant improvement in the work performance of employees, particularly in the finance department using RPA to automate repetitive tasks which are

error-prone. This will ultimately result in the improvement in organisational performance and productivity."

Theme 4: Business Functions and Employee Performance

AI adoption has a direct impact on employee performance as well as the business functions which have been assessed in this research through the investigation with professionals (Boyd & Holton, 2018). Participants also count the impact on employee performance on the experiences of customers based on the output of the machine learning and AI adoption. P2 claims that with AI adoption, most of the manual tasks of employees are simplified. AI adoption has also resulted in saving both time and money as per the responses of the participants. P3 asserts that things are done far more quickly by the staff and stated "a huge performance improvement" specifically in cases where a large amount of data is required to be analysed. The NTA obtained four times extra performance improvement by adopting Robotic Process Automation (RPA), as per the response of participants. Various business functions are improved with AI adoption in the company that aligns with an organisational and innovative culture. Study findings suggest that automated work functions significantly benefit the finance area. In addition, public transport services were also improved with the adoption of automated tools. P4 asserts that transport network design has been positively affected by AI adoptions' ability to predict passenger loads on busses. According to P4, people who manage the transport operator contracts, and the people who design the contract schedules are also positively influenced by AI adoption.

Performance evaluation and reviews provide the employees with an opportunity to determine what strengths and weaknesses are required to be focused on, and which skills are needed to be improved to enhance performance (Beyene et al., 2016). Also, advanced analytics

has resulted in the personalisation of learning experiences of the employees within an organisation. In this context, organisational and innovative culture plays a crucial role as it promotes the personal and professional development of employees (Popenici & Kerr, 2017). Various business functions are positively influenced by the adoption of AI within an organisation. These include the prediction of customer needs, improvement of sales forecasting, and improvement of communication (Ransbotham et al., 2017). It follows that time consumption and management for sales professionals can be ensured via the adoption of AI.

Additionally, it may also highlight which customers they can approach efficiently, and who they need to follow up with, thereby managing time and effort at the same time. The utilisation of continuous real-time assessment has ensured agile and modern performance management practices which promote regular feedback sessions for the evaluation of employees (Plastino & Purdy, 2018). Adoption of AI can reduce the burden and necessity of rigid performance evaluation cycles employed by the organisations. AI has the potential to conduct more relevant insights and induce flexibility in evaluation (Horowitz, 2018). With automated performance evaluation and assessment, timely feedback is also ensured, which can highlight the areas of improvement. A negative influence of irregular feedback has been reported on the performance of employees (Chang et al., 2017).

Q6: What are the future risks associated with AI Adoption?

P1 stated,

"I'm thinking if it's not well planned, then you could suffer from reputational risk financial risk. Two big ones there. For example, if you have a call centre that you put your chatbot on, or machine learning call answering service, something that's a little

bit more intelligent than press one for accounts or press two for bookings, if you get that wrong it's going to a reflect badly on the company, and it's going to give bad service to the customer and reflect badly on government to transport services as well."

P2 stated,

"I think there's a significant risk of obscuring the problems that are being generated by data acquisition and data creation. And that that's obscured by the application of artificial intelligence, that people automatically assume that the data is right. Or the outputs are right, and therefore make decisions based on that without really questioning. So, I think that's a big issue. I think there are issues around the use of AI. There's a risk associated with the perception of AI externally to the organisation. So, at the moment, it's probably known by people, and it's probably suspected by people that in some way we're able to analyse how people move around the city."

P3 stated,

"I think one of the things that one of the risks in having too much reliance on technology is maybe a quality issue. You're relying on the technology to do machine learning on a large amount of data. You need to have some kind of quality oversight to make sure that the machines are actually doing the right thing."

P5 stated,

"The NTA might face risks in the future linked to delayed adoption of AI systems and operations. Also, with limited access to technology, the business may have a significant impact on its transport and business operations."

Theme 5: Future Risks to AI Adoption

Participants of the study were questioned about the probable risks the NTA might incur following the integration and adoption of AI into its business operations. According to P1, 'reputational risk and financial risk' are the major risks the organisation might encounter. P2 highlighted that there is a significant risk of obscuring the problems that are being generated by data acquisition and data creation with the application of AI. Moreover, people assume that data is genuine and correct; even the outputs are considered accurate, which is a significant issue. Also, the risk associated with the perception of AI externally to the organisation was identified by P2. P3 considers that one of the risks in having too much reliance on technology might be the quality issue and relying on the technology to do machine learning on a large amount of data is risky. There is a need to have some kind of quality oversight to make sure that the machines doing the right thing (Gobble, 2019). P4 and P5 contend that there is no significant risk associated with the adoption of AI as automation tools are getting better, and they are more manageable and achievable. With the integration of more cloud technology and similar solutions, companies improve their information and communication prospects (Hassani et al., 2020).

Research has highlighted the certain level of risks companies may face with the adoption of AI (Collis & Hussey, 2014). The major risk associated with AI is the risk of breach of security and confidential information of the companies that are required to be protected and secured (Ivanov & Webster, 2017). Also, some customers may also feel uncomfortable with AI and may approach representatives and other employees and staff. Another risk highlighted in evidence is the outcomes in business gained after application of an inaccurate algorithm for AI adoption (Kaplan & Haenlein, 2019). Assessment of risks before taking the initiatives of AI adoption has been highlighted as a crucial strategy to conduct risk management on a timely basis (Edward et

al., 2018). Negative customer experiences might be triggered by the integration of AI within the organisation (Maher, 2014). However, in the case of organisations such as the NTA, adoption of AI is crucial to sustaining high quality and efficiency of work functions and to facilitate the employees (Maher, 2014). Domestic and national security is the main risk that is required to be assessed before AI adoption (McCall, 2019). Research has also highlighted the risk to the employment ratio and jobs of a significant number of employees with the adoption of AI (Quinton et al., 2018). Inclusion of AI in work functions is predicted to result in reducing the employment rate as more work would be replaced by the automated tools and machines in the organisations that might be incoherent with certain types of organisational cultures (Pearce & Pearce, 2020).

Responses of the participants complied with the literary findings presented in the literature review. Also, theme development has also ensured that the participant provided data complies with the scholarly evidence presented in the literature review

CHAPTER 05: DISCUSSION

Introduction

This chapter presents the discussion after analysis of the findings of the study following the application of thematic analysis. The previous chapter analysed five major themes which have been developed based on the responses of the participants. These include AI in the business of the NTA, strategies to adopt AI, organisational and innovation culture influence on AI, business functions and employee performance, and future risks due to AI adoption. This chapter will discuss the above analysis into three broad themes. These include AI in business, risk, and organisational and innovation culture.

Theme 1: AI in the business

From the responses of the participants, it can be argued that in adopting AI, the NTA is considered a pioneer organisation from a digital transformation perspective within the Irish public sector. Literature indicates the NTA's digital transformation leadership position is contrary to other Irish government organisations as argued by Schedler et al., (2019) stating that technology adoption within government is still in its infancy. Similarly, Ransbotham et al., (2017) maintain that the public sector has the lowest expectations for AI adoption in its effects with a disparity between initiative and customer service. Research has identified that barriers to adoption in the public sector form this conclusion. From an AI adoption perspective, it is proposed that the NTA is on par with pioneer firms in the Irish private sector such as Allsorter, Anderson, and SouxR that are all integrating AI in their daily business operations. However, Early (2020) suggest due to the limitation of the aforementioned firms' size that the scale of AI adoption has less impact than that of larger organisations. In this regard, the scale of AI adoption

for the NTA has reached the general Irish public illustrating that the NTA's AI implementation has surpassed Early's suggestion of limitation. Research findings indicate that innovation and technology adoption, as well as digitalisation in NTA has resulted in the improvement of operational performance in the organisation. In this regard, participants emphasised the organisations' motivation to adopt AI to efficiently predict passenger loads on buses. As a result of AI integration, passenger load prediction enhances the operator's capacity planning, driving efficiencies in transportation network design. Therefore, providing enhanced service to the consumer. This example from the findings demonstrates a key differentiator between laggards and pioneers; which is a firm's ability to execute organisational agility, the firms ability to respond rapidly and flexibly to customers' needs, adapt production/service delivery to demand fluctuations, and implement decisions in the face of market changes (Brock & von Wangenheim, 2019). Thus, contrary to the literature regarding public sector AI adoption, the NTA has established itself as a Pioneer in an Irish public sector context.

Theme 2: Risk

Experimenter organisations are continually seeking opportunities to introduce AI technology to increase their efficiency, competitiveness, and business outcomes (Maher, 2014). Literature shows that while AI has several positive advantages in the organisation, such as enhancing operational efficiencies, there are also predefined barriers and drawbacks to bear in mind (Mane, 2014). According to participant responses, it is maintained that one of these barriers included the initial lack of organisational support due to perception and risk as described in the study findings. Technology leaders and executives within the NTA have taken a significant risk in the initial phases of AI adoption. From the responses of P2 and P3 it can be observed that the

NTA had been experimenting in the use of AI technology and innovation in its business functions, but the overall acceptance was slow initially due to organisational commitment as a barrier to adoption. Literature has highlighted that organisational commitment is a key factor for innovation and subsequent adoption of technology (Khan et al., 2010). From the responses of participants P2 and P3, it can be established that the NTA technology leader's implementation strategy of AI was that of "stealth and build it and they will come". This doesn't just apply to senior leadership within the NTA's organisation but also applies to the publics positive reaction to the implementation of AI. Participants of the study were interviewed regarding the approach to overcome the initial organisational commitment barrier. According to the analysis of the responses of P2 and P3, leadership, innovation culture, and staff performance was essential in delivering a proof of concept, proving the business case, and showing value in AI adoption to senior stakeholders. In this regard, and according to the literature, Khan et al., (2010) emphasise that senior management support and alignment with the organisational vision are key drivers to innovation adoption.

Theme 3: Organisational and Innovation Culture

As per the findings and analysis, the NTA has developed a technological based organisational culture that has enabled the success of innovation within the Irish public sector. It is essential to evaluate and understand the impact of organisational and innovation culture in an Irish context, as it results in determining what factors should be focused on when creating a successful organisational structure based on innovation in organisations (Chang et al., 2017). Research has identified that Pioneer organisations are open to collaboration both internally and across network channels and is a vital factor to a successful innovation culture. As highlighted by

Brock and von Wangenheim (2019) developing an innovation ecosystem opens the options for innovation beyond the organisations' limitations and allow the organisation to leverage the strengths and capabilities of their supplier and vendor business relationships. There is evidence within the research to suggest that further collaboration could be achieved with the advent of an innovation centre for excellence, that would be shared between networking partners. Furthermore, participants of the study reported the collaboration with Irish technology leaders has resulted in the identification of effective technology adoption strategies as well as improved the collaborative teamwork within the organisation. The collaborators of NTA include Arkphire, Transport Infrastructure Ireland and Jacobs Engineering Ireland Limited. The organisation is further expanding its network of collaborators for the adoption and integration of AI via networking with technology-oriented organisations. Executives and technology leaders in the NTA aim to further their collaboration with the pioneer organisations which have been achieving innovation milestones in the Irish transport industry through the adoption of AI.

CHAPTER 06: CONCLUSION

Conclusion

The main objective of this research is to assess the relationship between organisational support, innovation culture, and technology adoption. The relationship between these three factors is essential, and to highlight the potential of organisations in adopting technology and sustaining it. Also, the study is critical for business owners to assess the role of innovation culture in promoting technology adoption. It is recognised that the challenges encountered in business can be resolved through the adoption of AI. The growing interest in the adoption of AI has also resulted in increased implementation, using it for the generation of revenues and efficiency. For the enhancement and improvement of productivity, the TOE framework has been approached at the organisational level to influence the factors that tend to affect the AI adoption decisions. The findings of the study are significant as they tend to address the effects of an innovation culture and the implemented organisational culture on technology adoption. Organisational culture and framework play an important role in adopting the policies that either promote or demote the integration of technology within the firm. The frameworks that are utilised to addresses the integration and adoption of technology within an organisation need to be assessed for their effectiveness. The organisational dimensions describe the various business characteristics and resources which include managerial structure, firm size, communication and decision making; that may influence the technology adoption and integration process. The frameworks that have been addressed within this study by the firms intending to adopt AI can utilise TOE, as it analyses the firm from three different dimensions; including organisation, technology and environment. Within and outside the firm, the technological aspects include all the relevant technologies.

Research findings conclude that with effective support provided by the organisational and innovative culture, AI can efficiently be adopted by the firms willing to improve their work efficiency and performance. Findings of the study have been summarised under five major themes which include AI in the business of the NTA, strategies and factors to drive adoption of AI, organisational and innovation culture influence on AI, business functions and employee performance, and future risks due to AI adoption. Based on these themes and analysis of the responses of the participants, it can be asserted that the majority of organisations are willing to invest substantially in the AI adoption schemes to enhance their productivity and performance. Based on the analysis of study participants' responses, it can be contended that with AI adoption, the NTA has experienced significant enhancement in their performance and productivity. In the adoption of technology and specifically AI, significant challenges and barriers are encountered by companies such as lack of organisational support, lack of investments, inaccessibility to efficient resources, and lack of access to government support and funds. Individual negative perceptions associated with AI are also discussed in this study. AI fails to process tasks that involve human emotions. The teaching and education sector cannot efficiently take advantage of the technology with AI as a teacher and educator to the student. Solutions for failures of AI can be addressed via enhancement of the efficiency of currently adopted AI technology. Moreover, shifting to updated AI prospects via use of governmental funds can also serve to improve the negative perceptions associated with AI. There is a growing concern that the introduction of AI into the organisation may harm business and economies as staff working hours are reduced, and employment is lost. AI may further threaten the economic state of the country by affecting the economic scale of large and small enterprises.

AI offers significant benefits within an organisation and noted advantages for employees. AI technologies are beneficial for employees in different areas, such as by easing tedious routine work, surging work labour productivity, and enhancing comfort in lives. Academic authors also benefit from AI via the services offered by specific writing correction software and the use of algorithms that suggest better ways of phrasing sentences. Technology adoption in the organisation is a dynamic approach that enables the professionals to use AI-based technology prospects for the success and growth of the organisation. To address the adoption of AI as a robust innovation approach, current literature presents unclear evidence at this time. Significant levels of disparity are observed in the understanding of the implications of AI and how it can be adopted for active business under a competitive organisational culture. Firms' characteristics play an essential role in promoting or discouraging the adoption of innovation, which includes firm size, technological readiness, top management support, and relative advantage.

Recommendation

Based on the analysis of findings in this research, some recommendations have been presented. For the efficient adoption of AI, organisations must develop an effective innovation-oriented culture and implementation of this type of culture must be ascertained through different strategies. Organisations must also budget or obtain capital investment for further integration or experimentation. Researchers in academia are required to investigate the common as well as infrequent challenges companies face when they intend to adopt AI. This may also help in identifying the effective strategies that can be manipulated for mitigation of these barriers to the adoption of AI. Current research prospects in the adoption of AI are limited to only the identification of barriers in this domain. However, they do not highlight the effective strategies

that can be practiced for the mitigation of these barriers. Thus, there is a significant requirement for the exploration of strategies that can be employed for the mitigation of these challenges and barriers in the adoption of AI. Pioneer companies are also expecting a reduction in employment due to the adoption of AI. This may reflect the strategies pioneer companies may take in the future to reduce the workload of employees by integrating AI, which must be complied upon by the laggards.

There is a significant need for the development of organisational frameworks in Irish companies, to address the requirement of integration of AI in the SMEs. The findings of this research indicate that not all the factors that drive AI adoption in the firm are highlighted in the current literature and are also not recognised or understood by leaders in firms. Thus, the establishment of innovative organisational culture is necessary for Irish companies to achieve the benefits of AI adoption. Additionally, government funds and investments must also be obtained by these firms to address the needs of costs and budgeting to gain access to robust AI infrastructure.

Future Practice and Implications of Research

Research has identified the need for the development of effective technology-based frameworks for the companies intending to improve their performance and productivity for the long term. Thus, by evaluating the prospects and factors associated with an organisational and innovative culture that promote technology adoption and integration, study findings have identified various influencers that restrict the business owners and policymakers in the integration of technology within the organisation. Findings of the study are significant for research students and professionals in the academic domain intending to explore the influence

made by organisational and innovative culture on the technology adoption within the

organisation. Furthermore, by assessing these findings, students may identify what factors are

required in the development of technology promoting innovative culture and how they can

influence technology adoption within the organisation.

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Appendices

Appendix: Interview Questionnaire

This research survey discovers the importance of organisation and innovation culture in AI adoption. AI is defined as a system's ability to correctly interpret external data, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation. This survey is entirely anonymous, so any answers given will not be traced back to any one individual. The survey consists of 10 questions and takes approximately 2 minutes to complete. All participants are free to opt-out at any time during the survey. Surveyor is contactable at x18122566@student.ncirl.ie.

Age

- 30-40
- 40-50
- 50+ above

Gender
- Male
- Female

Position
- Senior executive
- Technology leader

Experience
- 10+ years
- 15+ years

1	What are your perceptions of artificial intelligence (AI)?
2	What are your perceptions of technology adoption in the organisation?
3	What strategies have been taken by your company to adopt AI?
4	Do you feel the organisational culture of the NTA supports technology adoption?
5	In your view, what impacts are made on employee performance due to AI adoption in the NTA?
6	What are your perceptions of innovation culture?

7	Do you think organisational/innovation culture has a positive or negative role in tech adoption?
8	Have there been any drawbacks in the company's organisational culture that challenged technology adoption?
9	What are business functions significantly influenced by AI adoption?
10	What future risks might the NTA face with the adoption of AI?

Table 2: Participant Information

Participant	Age	Experience	Gender	Occupation
P1	40+	15+	Female	Technology Leader
P2	40+	15+	Male	Technology Leader
P3	50+	10+	Male	Senior Executive
P4	50+	10+	Male	Senior Executive
P5	45+	10+	Male	Technology Leader
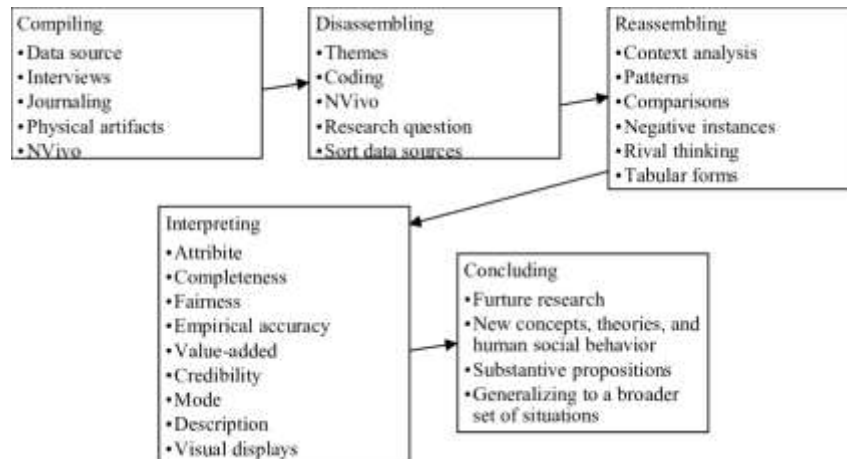
Figure 2: Data Analysis Approach Source: Yin (2014)