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TITLE ***TIKĖJIMO TECHNOLOGIJŲ ATEITIS: SKAITMENINIŲ RELIGINIŲ PATIRČIŲ VERSLAS***	***TITLE*** ***THE FUTURE OF FAITH-TECH: THE BUSINESS OF DIGITAL RELIGIOUS EXPERIENCES***

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List of Abbreviations

VR: Virtual Reality

AI: Artificial Intelligence

TAM: Technological Acceptance Model

AR: Augmented Reality

IRB: Institutional Board Review

Faith-tech: Faith Technology

Summary

Technological innovation in the area of faith has continued to proliferate in the recent past, with factors such as COVID-19 accelerating the adoption of faith tech. Virtual Reality (VR) for liturgy has been touted as a possible technological advancement that can improve faith experiences, due to its immersive nature, realness, and animation characteristics. This study utilized an entrepreneurial lens to assess the possibility of the integration of VR for liturgy within the Nigerian Catholic Church. A mixed-methods study was conducted, where 171 participants, including lay faithful, seminarians, theologians, and clergy (n = 171) participated in a survey, while n=20 responded to interview questions. Statistical analyses from the survey indicate moderate acceptability, pointing towards a potential market among the Nigerian Catholic segment. In the interviews, while participants acknowledged VR as a necessary innovation in today's digital world, several concerns were identified, including the lack of communal participation, questions regarding sacredness, and theological concerns regarding whether it can maintain the required level of liturgical integrity. A fundamental finding from the research is that while VR for liturgy may not be immediately accepted due to the theological and sacramental limitations, the technology can be used alternatively for prayer, youth management, worship, pilgrimage, and catechesis. In line with the technological acceptance model (TAM), innovators and entrepreneurs must ensure that they create a technology that will receive widespread acceptance among the Catholic congregants. Efforts should include creating models that enhance privacy and confidentiality and are culturally appropriate. In addition, ease of use should be considered to ensure that all people, regardless of their ages, utilize the technology with great convenience and efficiency. Entrepreneurs must incorporate church leaders in the development of the technology to ensure that the final product is tailored to the needs of the Catholic faith. The collaborative model also forms the foundation of checks and balances, ensuring that fundamental sacramental, cultural, and ethical aspects are taken into consideration. However, it is important to recognize some of the challenges associated with the research, including a lack of diversity among participants and the cross-sectional nature of the inquiry. Therefore, future studies should strive to expand the participant base and consider longitudinal models to effectively capture acceptability and business feasibility aspects of this technology.

Keywords: Sacramentality, ecclesiastical order, doctrine, faith-tech, VR, Catholic Church, Nigeria

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Summary in Lithuanian

Pastaruoju metu technologinės inovacijos tikėjimo srityje toliau plito, o tokie veiksniai kaip COVID-19 paspartino tikėjimo technologijų diegimą. Virtuali realybė (VR) liturgijoje buvo išgirta kaip galima technologinė pažanga, galinti pagerinti tikėjimo patirtį dėl savo įtraukiančio pobūdžio, realumo ir animacijos savybių. Šiame tyrime buvo naudojamas verslumo prizmė, siekiant įvertinti VR integracijos į liturgiją Nigerijos katalikų bažnyčioje galimybę. Buvo atliktas mišrių metodų tyrimas, kuriame apklausoje dalyvavo 171 dalyvis, įskaitant pasauliečius, seminaristus, teologus ir dvasininkus (n = 171), o į interviu klausimus atsakė n = 20. Apklausos statistinė analizė rodo vidutinį priimtinumą, rodantį potencialią rinką tarp Nigerijos katalikų segmento. Interviu metu, nors dalyviai pripažino VR kaip būtiną inovaciją šiandienos skaitmeniniame pasaulyje, buvo nustatyta keletas problemų, įskaitant bendruomeninio dalyvavimo stoką, klausimus dėl sakralumo ir teologinius rūpesčius dėl to, ar ji gali išlaikyti reikiamą liturginio vientisumo lygį. Esminis tyrimo atradimas yra tas, kad nors VR liturgijai gali būti ne iš karto priimta dėl teologinių ir sakramentinių apribojimų, ši technologija gali būti naudojama alternatyviai maldai, jaunimo valdymui, pamaldoms, piligriminėms kelionėms ir katechezei. Vadovaujantis technologinio priėmimo modeliu (TAM), novatoriai ir verslininkai turi užtikrinti, kad sukurtų technologiją, kuri sulauktų plataus katalikų bendruomenės narių pripažinimo. Reikėtų stengtis kurti modelius, kurie stiprina privatumą ir konfidencialumą bei yra kultūriškai tinkami. Be to, reikėtų atsižvelgti į naudojimo paprastumą, siekiant užtikrinti, kad visi žmonės, nepriklausomai nuo jų amžiaus, galėtų naudotis technologija labai patogiai ir efektyviai. Verslininkai turi įtraukti bažnyčios vadovus į technologijos kūrimą, kad galutinis produktas būtų pritaikytas prie katalikų tikėjimo poreikių. Bendradarbiavimo modelis taip pat sudaro kontrolės ir pusiausvyros pagrindą, užtikrinant, kad būtų atsižvelgta į pagrindinius sakramentinius, kultūrinius ir etinius aspektus. Tačiau svarbu pripažinti kai kuriuos su tyrimu susijusius iššūkius, įskaitant dalyvių įvairovės stoką ir tyrimo skerspjūvio pobūdį. Todėl būsimuose tyrimuose reikėtų siekti išplėsti dalyvių bazę ir apsvarstyti išilginius modelius, siekiant efektyviai užfiksuoti šios technologijos priimtinumo ir verslo įgyvendinamumo aspektus.

Raktiniai žodžiai: sakramentalumas, bažnytinė tvarka, doktrina, tikėjimo technologijos, VR, Katalikų Bažnyčia, Nigerija

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The Future of Faith-Tech: The Business of Digital Religious Experiences

CHAPTER 1: INTRODUCTION

1.1 Background and Context

1.1.1 The global rise of digital faith practices

The 21st century is experiencing a digital revolution that has a sweeping effect on virtually every sector. One of the most unlikely places that has recently embraced digital innovation is religion and faith-based practices. Campbell (2024) asserted that digital religion encompasses ways in which modern technologies influence and shape religious practices, beliefs, expression, and community in the contemporary world. As the leading Christian denomination, the Catholic faith has been at the forefront of technological integration. Three of the last popes were aware of the potential implications that digital incorporation would have for the church. For instance, John Paul II, in his encyclical Redemptor Hominis, welcomed technological progress but cautioned that the growth should go hand in hand with the improvement of Christian morals and ethics (Izquierdo-Iranzo, 2025). For his part, Benedict XVI established the Pontifical Council for the Promotion of the New Evangelisation in 2010, a body whose purpose was to find new means of evangelization in the face of the growing secularization (Izquierdo-Iranzo, 2025). His successor, Pope Francis, in his encyclical Laudatio Si, acknowledged the benefits of modern technological advances while warning that they also pose significant risks to humanity (Izquierdo-Iranzo, 2025). By the turn of the millennium, the Catholic Church had begun opening its doors to the digital world, which it regarded as a new conduit for the gospel. According to Giorgi (2019), the Vatican directly runs up to 78 websites and also manages social media pages on Facebook and Twitter. At the local level, dioceses are relying on social media pages, including streaming platforms such as YouTube, to evangelize (Giorgi, 2019).

1.1.2 Context

Like most countries in Africa, Nigeria has Christianity as the most dominant religion. Protestants are mainly found in the south-western part of the country, dominated by the Yoruba people. On the contrary, Catholics are primarily found in the Eastern part, mainly comprising the Igbo people (Somefun, 2019). The Roman Catholic Church is the largest denomination in Nigeria, with over 30 million adherents, which is approximately 15% of the population (Pillar, 2023). During the pandemic, physical worship was disrupted, and Catholics in the country were significantly affected. Many parishes across the country were compelled to adapt, often resorting to the live broadcast of Mass to enable adherents to celebrate the Holy Eucharist from the comfort of their homes (*Mass Streaming*, n.d.). Despite the conservative nature of the Catholic Church, live broadcasting of Mass was the first step towards technological integration in liturgy.

Since then, not much innovation has been reported in the Nigerian Catholic Church, especially after the resumption of physical Mass celebration post-pandemic. In other countries, virtual technologies powered by the Internet revolutionized the way people worship, especially with the advent of virtual church services (Wijaya et al., 2023). Today, spiritual and prayer applications are on the rise and can be accessed via the smartphone (Laird et al., 2024). The Internet and software applications have also made it possible for believers to access a host of online resources that include church periodicals, Bible lessons, and online confessions, among others (Swihart et al., 2023). The growth of virtual technologies has also redefined how faith communities worship, gather, and engage in their respective groupings. With the advancement in technologies such as artificial intelligence (AI) and virtual reality (VR), more capabilities are being redefined in many unimaginable ways. Such advancements challenge Nigerian Catholic stakeholders to embrace change, amidst the conservative nature of the religion and the lack of investors willing to inject financial resources into such novel technologies that support prayer and worship.

1.2 Statement of the Problem

As illustrated by the sentiments of the previous Popes, the Catholic Church recognizes the significance of technology in evangelization and in supporting church activities. Nonetheless, the Catholic Church is highly structured and conservative in its approach to new and emerging technologies due to the understanding of how modern innovation can be disruptive, if not properly used. With the success of livestreaming technologies during the pandemic, VR has been touted as the next technological innovation with the potential to revolutionize the church experience. Jun (2020) emphasized this by saying, "VR church is more effective in making Christian faith real and experienceable by creating virtual environments" (p. 3). However, the acceptability (demand), market potential, and design aspects that can lead to VR adoption in the Nigerian Catholic Church and the Catholic fraternity in general have yet to be explored. The religious space is still viewed from a conservative perspective, with physical worship being associated with ecclesiastical and theological order. This is a missed opportunity, both from a religious and business standpoint, given that VR has been proven to create an all-inclusive environment for worship that is welcoming even to outsiders (Jun, 2020). In addition, VR is essential in the church setting as it is not confined to geographical space, providing a radically inclusive environment for all persons, regardless of their location (Jun, 2020).

Deep tech innovations are disruptive in nature and are developed by highly qualified innovators or entrepreneurs. Entrepreneurship in this field continues to thrive, especially with the proliferation of technologies such as robotics, AI, VR, AR, and Internet of Things (IoT). There is a gap in knowledge about why entrepreneurs are not looking at the Catholic Church

as a potential market, despite the success of other innovations, such as prayer applications, livestreams, and online rosaries. With Nigeria having over 30 million Catholic adherents based on statistics by Akinkuotu (2025) and with religious leaders seeking to reach more people, particularly the younger ones, there is a need to integrate creative and innovative ways into worship. However, this potentially challenges the status quo in the Catholic Church, a hierarchical institution that is governed by strong theological and canonical laws. On the one hand, VR promises to create an efficient and all-inclusive environment. On the other hand, it threatens to violate the existing church laws and meet unmatched resistance from the church hierarchy. In light of this tension, there is a need to perform a comprehensive research that first tests the acceptability of VR for liturgical purposes, which will then shape demand. The study will then identify the market potential and the design features that will improve acceptability, increasing the product's demand within the Catholic faith.

1.3 Research Aim and Objectives

1.3.1 Aim

The aim of the research is:

- To assess how VR liturgical tools can be integrated into the Nigerian Catholic Church through a deep-tech entrepreneurial lens, with a focus on theological and practical needs.

1.3.2 Objectives

The study is driven by multiple objectives. Among them are:

- To assess the demand and acceptability of VR tools within the Nigerian Catholic Church.
- To identify the market potential of the VR tools among Nigerian Catholic adherents.
- To identify the design features that will enhance the acceptability, demand, and competitiveness of the VR tools.

1.4 Research Questions

The research questions for this study include:

- What factors influence the acceptability of the VR liturgy tools in the Nigerian Catholic Church?
- What is the market potential and growth prospect for VR for liturgy tools in the Nigerian Catholic Church?
- What design factors will this deep tech innovation consider to improve user experience and adhere to the Catholic doctrines?

1.5 Theoretical Frameworks

This research is premised on the entanglement framework developed by Alexander (2020). This author emphasizes the deep interconnection between technology and religion,

which he metaphorizes as "threads knotted together." Alexander (2020) further emphasizes that technology and religion are not separate entities, where one reacts to the other. Rather, the two have a relationship whereby one directly influences the other. For instance, in some cases, religion shaped the way people used technology, perceiving it as a divine gift from God. In others, religion can trigger questions to interrogate the power or legitimacy of a particular innovation (Alexander, 2020). Thus, in the modern dispensation, Alexander (2020) argues that technology is inseparable from the church. As new innovations continue to emerge, it is vital to test Alexander's (2020) hypothesis about the degree of symbiosis. This research provides an opportunity to interrogate the extent to which VR fits within the church's fabric, an essential element not only for theologians but also for business providers of Faith-Tech tools.

The second and most crucial theoretical model for this research is the technology acceptance model (TAM). TAM investigates the reasons behind the acceptability of new innovations in the organization and even in the market setting. People will accept or reject certain technologies based on their overall views or perceptions towards them (Kalayou et al., 2020). Before a person can integrate a new technology, they pay considerable attention to variables such as its ease of use, projected usefulness, and their feelings or attitudes towards these innovations (Kalayou et al., 2020). The theoretical model is central to this research. Firstly, it provides the basis for investigating the attitudes of clergy and laypersons towards the deep-tech technologies being integrated into the church's operations. Secondly, from an entrepreneurial perspective, particularly marketing, TAM offers parameters that business personnel can use to evaluate the church industry and determine whether the proposed innovations will be acceptable. In this regard, TAM is a comprehensive theoretical framework that will serve as a pillar in filling the main gaps in the study.

1.6 Scope of the Study

The scope of this study describes the confines or boundaries of the inquiry. Geographically, this study will focus on Nigeria. Demographically, the Catholic Church will form the study's focus. Only a certain category of participants will be involved in the research, including theologians, clergy, and laypersons, due to their active engagement in religious life. Technology integration in religious culture is at the heart of the study. However, this inquiry will confine itself to VR as the primary technological tool of concern. Other innovations, such as chatbots, biotech, and blockchain, will be excluded. While a comprehensive understanding of the deep-tech innovations is essential, this study will not address the full software development process. Rather, it is limited to the conceptual and strategic design of faith-based platforms.

1.7 Significance of the Study

The study has several implications for multiple stakeholders. In academia, the research contributes to the faith-tech debate by evaluating deep-tech entrepreneurship within the context of the Catholic theological framework. The study looks at how technological integration will influence religious facets in the Nigerian Catholic Church, focusing on aspects such as sacramentality, ecclesiology, the nature of liturgy, and theological anthropology. For religious institutions in Nigeria, the findings of the study will help identify how stakeholders can apply digital technologies without adversely affecting the much-needed theological integrity. Although it seeks to propose tailor-made and culturally sensitive innovations, it also addresses any pastoral concerns that may emerge. The outcomes of the study will also impact entrepreneurs in the Faith-Tech industry. Business personnel dealing with deep-tech ventures must prioritize innovations that align with the dominant religious culture, emphasizing antecedents such as user-centrality and ethical design to align with the values of the Catholic Church. The study seeks to highlight the significance of socially responsible entrepreneurship, especially when exploring religious markets. Lastly, this research has implications for policymakers. As previously acknowledged, Nigeria is on the precipice of a digital transformation hallmarked by disruptive technologies such as VR. As entrepreneurs target faith-based institutions, policies need to be advanced on how technological advancements should preserve rather than erode cultural preservation.

1.8 Chapter Summary and Structure

This chapter has introduced the topic, including the research aims, objectives, and questions. The goal is to assess how VR technologies can be integrated into the Nigerian Catholic Church through a deep-tech entrepreneurial lens. The outcomes of this study will help deep-tech entrepreneurs develop tailor-made products that make the practice of the Catholic faith more efficient and inclusive for Nigerians. Furthermore, this study contributes to knowledge regarding socially responsible entrepreneurship, whereby business personnel should focus on novel products that respect deeply established traditions and norms, especially when targeting the religious sector. The research fits within two theoretical models, including the entanglement framework and TAM, both of which focus on the acceptance and applicability of emerging technologies.

Now that this chapter has introduced the topic, Chapter 2 will discuss all applicable literature on the subject, with an emphasis on concepts such as digital theology, deep-tech entrepreneurship, and the intersection between faith and contemporary technology. Chapter 3 is the methodology, whereby a mixed-methods design that combines qualitative interviews and quantitative surveys is presented. The results and analysis will follow in Chapter 4, where all findings will be presented based on the responses acquired. Chapter 5 will discuss the

findings within the context of the literature and the proposed theoretical lenses. In Chapter 6, the research will summarize the findings, identifying recommendations both at the research and implementation levels. Study weaknesses will also be recognized at this juncture, including how they can be resolved in future inquiries.

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CHAPTER 2: LITERATURE REVIEW

The literature review investigates the primary themes related to the research question and objectives. The main themes explored include faith-based digital innovations, deep-tech applications in societal factors, theological frameworks, and entrepreneurship and innovation models in religious contexts. Other themes include digital theology and technological mediation of faith, existing faith-tech platforms, and the conceptual frameworks. The existing gaps in the literature have been recognized. The literature review is primarily comprised of recent secondary materials, including peer-reviewed journals and books published within the last 5 years. In addition, Catholic publications have also been incorporated.

2.1 Overview of Faith-Based Digital Innovation

Digital innovation has permeated the religious spectrum in the last decade. Campbell (2020), in his text, "Digital Religion: Understanding Religious Practice in Digital Media," contends that the proliferation of digital technology in religious practice has been influenced by necessity and innovation. Digital technology is now essential in enhancing worship experiences and fostering a sense of community (Campbell, 2020). In addition, the digital revolution in the church is seen as a legitimate way of reaching out to younger audiences. One Polish study conducted in 2020 at the heart of the COVID-19 pandemic showed the extent to which the Catholic Church had embraced digital technologies in worship. The outcome indicated that approximately 40.8% of parishes in the country conducted online mass broadcasts (Przywara et al., 2021). The primary platforms used included YouTube (18.9%) and Facebook (18.7%) (Przywara et al., 2021). The outcome aligns with Campbell's (2020) assertion that digital innovation was partly a matter of necessity, considering that the pandemic prevented individuals from conducting physical worship sessions due to the public health implications.

Nevertheless, the hesitation to incorporate digital innovations within the Catholic faith remains an issue of concern. One qualitative study by Dein and Watts (2023) investigated the experiences of participants attending online church services in Cambridge. In summarizing the outcomes, the researchers asserted that "The interviews reveal that virtual services, while better than nothing, have significant limitations in terms of participation, belonging, and the kind of religious experience engendered" (Dein & Watts, 2023, p. 191). Eucharistic celebration is one of the most fundamental tenets of the Catholic faith. However, in the online spaces, it was impossible for the congregants to partake of the bread and wine, diminishing the significance of the Mass (Dein & Watts, 2023). Furthermore, in 2020, "The Catholic Weekly," a prominent Catholic journal, documented Pope Francis's resentments towards virtual worship. According to Pope Francis, while combating the pandemic was essential, the shift to online masses detached congregants from the sacrament (Catholic News Week, 2020). He

further emphasized that the ideal church comprises the physical interaction between the people and sacraments (Catholic News Week, 2020). In another study by Blackmer (2024), the author identifies two primary concerns associated with the development of faith-based digital innovations. Firstly, it is likely to jeopardize the integrity of the communal, sacramental, and liturgical embodiment (Blackmer, 2024). Secondly, with the inherent digital divide in society, some demographics are more likely to be excluded from the word of God (Blackmer, 2024). This depicts the conservative nature of the Catholic Church, especially as regards the incorporation of disruptive digital technologies.

Despite the conservative nature of the Catholic Church, existing evidence shows the continued incorporation of diverse digital technologies. One study that focused on Spanish Catholicism identified more than 16 Catholic YouTube channels for evangelism purposes (Fuente-Cobo et al., 2023). These YouTube pages had between 373,000 and 1,630,000 subscribers (Fuente-Cobo et al., 2023). As a result, this demonstrates how religious broadcasting of faith-based messages has slowly shifted from legacy to digital spaces. Despite Pope Francis's resentment towards technological integration into the heart of the Catholic practice, previous popes demonstrated a more welcoming attitude. For instance, Widodo (2022) argued that in 2002, Holy Father John Paul II viewed the Internet as an opportunity for evangelism insofar as it remained cognizant of its strengths and weaknesses. In the following years, his successor, Pope Benedict XVI, engaged in a scholarly theme titled "New Technologies, New Relationships: Promoting a Culture of Respect, Dialogue, and Friendship" (Widodo, 2022). Against the backdrop of these realizations, the Catholic Church continues to embrace digital media for its benefits. Widodo (2022) identified the primary advantages associated with digital media, including dissemination to a wider demographic and the ability to reach marginalized people who are not accessible using traditional means.

In summary, understanding how the faith-based digital innovation has infiltrated the Catholic Church points towards a potential market for VR. At the moment, the likelihood of VR integration into the church has not been explored. Assessing the existing attitudes and efforts in various countries serves as a feasibility test to determine whether VR will be accepted and turned into a business opportunity.

2.2 Entrepreneurship and Innovation Models in Religious Contexts

Religious entrepreneurship is not a very common concept in the literature, considering the prevalent belief that religion and business should not be mixed. However, as illustrated by Smith et al. (2023), modern researchers have shown interest in studying the intersection between the two disciplines. Generally, religious entrepreneurship focuses on ventures that are directly inspired by religious virtues and advance moral goals (Smith et al., 2023). Several studies have been conducted to evaluate the impact of religious values on business

interventions. For instance, Dubard Barbosa and Smith (2024) found that business personnel who incorporate religious beliefs into their ventures tend to assess opportunities more positively than their counterparts who do not. In another research, Jia et al. (2023) noted that religiosity can motivate individuals to engage in social entrepreneurial intentions. Thus, these studies emphasize how religious values are important in shaping business opportunities and philosophies.

Another significant concept to consider is faith-based entrepreneurship. According to Raimi and Raimi (2024), faith-based entrepreneurship seeks to bridge the gap between faith and business "with the intent to create value, transform lives, provide goods and services, and create jobs for people, thereby promoting prosperity for communities and nations" (p. 251). Ellis (2024) further intimated that faith-based entrepreneurship enhances ethical and socially conscious business and further contributes to financial achievement. It combines profitability with purpose and challenges the status quo by influencing both the market and society (Ellis, 2024). For this reason, deep-tech enterprises must strive to balance between profitability and spiritual enrichment. Wickramasekera et al. (2021) asserted that the spiritual development of entrepreneurs is essential for developing virtues such as kindness, fairness, and improved awareness of client needs.

In summary, exploring this theme is essential given that it seeks to highlight the two facets of this study – theology and entrepreneurship. By showing that religion and business can merge, business leaders can increasingly view the church as a market for deep tech innovations. Therefore, this can open pathways to assess various entrepreneurial opportunities using groundbreaking technologies that seek to improve the worship experience.

2.3 Digital Theology and Technological Mediation of Faith

Digital theology is primarily concerned with how technology affects people's learning about God, practicing their faith, and expressing their religious beliefs (Bingaman, 2023). Deep-tech tools such as AI and VR continue to play a significant role in promoting evangelism. According to Odeleye and Ojo (2025), social media platforms such as YouTube, Facebook, and Instagram rely on AI algorithms to reach wider audiences. For instance, a church with a YouTube channel may need AI to recommend content to users interested in spiritual material (Odeleye & Ojo, 2025). Furthermore, Chatbots can offer a platform for continuous engagement with local and international audiences (Odeleye & Ojo, 2025). AI can also be used for personalized messaging and targeting, especially when approaching diverse congregations. Nevertheless, there is a need to ensure that AI usage is not only ethical but also aligns with the broader theological tenets. Digital theology also encompasses the development of the VR church. Jun (2020) asserted that the mission and underlying beliefs of the VR churches are the same as those of their evangelical counterparts. The only difference is that the VR church

is highly inclusive and incorporates anyone who wishes to worship on the VR platform (Jun, 2020). Thus, the accommodative nature of these churches means that they can incorporate atheists and non-believers, spreading the Christian faith beyond its initial confines.

Nevertheless, it is worth noting that digital theology is associated with several controversies that may adversely affect the church tradition. Concerning the incorporation of VR into the church, critics have questioned whether it is necessary to consider the VR space as an authentic expression of Jesus Christ's church (Jun, 2020). Counterarguments have indicated that what defines a church is the presence of God's spirit and not necessarily geographical or architectural elements (Jun, 2020). Another controversy regards whether the lack of participation of the congregants in the sacraments is a problem. Jun (2020) asserted that in VR churches, only created avatars participate in the sacraments, which contradicts conventional ecclesiastical practices. Another study by Laird et al. (2024) found that while mobile applications are more likely to enhance spiritual growth, cases of deteriorating physical and mental health were also reported. In addition, the move to online worship may also weaken social connections, one of the most significant hallmarks of the church tradition (Laird et al., 2024). In 2020, Cardinal Robert Sarah penned a letter to Catholic bishops worldwide, urging a return to the physical Mass. He cited Matthew 18:20 as the basis of physical worship and went on to emphasize the significance of the community in Christian faith (Catholic News Agency, 2020). Such attitudes make it increasingly challenging for digital theology to take root in the Catholic faith.

Another area, particularly within the Catholic faith, that is subject to digital theology is penance. Macaraan (2021) asserted that penance is the sacrament of confession and is regarded as a powerful rite in the healing process. In addition, it reconnects an individual back to their community via the forgiveness of sin (Macaraan, 2021). In the current format, penance is sought in person, with the individual directly interacting with the priest. However, with barriers such as COVID-19 and the advancement of digital tools, there have been calls for Catholic priests to evolve and embrace online penance. Del Rio (2024) argues that the gift of forgiveness cannot be limited by geographical barriers. Canonical barriers should be eliminated, allowing for "distance forgiveness," just the same way Christ breathed his spirit to people and instructed them to use it to forgive others as documented in John 20:23 (Del Rio, 2024). With the advancement of AI, particularly robotics, there is speculation that priests could delegate the penance responsibility to trained robots that can listen and offer spiritual guidance (Dick, 2024). For instance, in 2019, Catholic churches in Italy, Peru, and Poland installed a robot called "SanTO" to listen to confessions among Church members (Dick, 2024). However, Dick (2024) questions whether the clergy privilege – which forbids judicial inquiry into details

shared during penance – can extend to communications between an individual and an AI robot.

Another significant concept regards the technological mediation of faith, which focuses on evaluating how digital tools can help individuals interact with their faiths. There have been mixed research outcomes regarding the impact of technological advancement on how people interact with their faith. For instance, one school of thought has shown that the advancement of deep-tech technologies such as AI and robotics has contributed to declines in religiosity across various cultures (Jackson et al., 2023). Conversely, research on modern conversational AI tools, such as ChatGPT, has shown that technology can improve people's faith through religious education and biblical teaching (Chrostowski & Najda, 2025). The use of this technology has demonstrated significant implications for biblical studies through text analysis, in-depth reflection, critical interpretation, and creative assimilation (Chrostowski & Najda, 2025). Tarihoran et al. (2024) further recognized the vital role that technology plays in catechesis, which is the foundation of faith in many religious denominations, particularly Catholicism.

In summary, understanding the diverse debates on digital theology uncovers potentially new ways in which people perceive their exercise of faith. The general notion is that technology offers individuals new ways of expressing their religiosity, which offers deep tech developers a chance to create a market opportunity for new products. Furthermore, understanding the controversies is also essential in identifying gray areas that could potentially adversely affect business.

2.4 Existing Faith-Tech Platforms and Gaps

There are several faith-tech platforms that are being used to advance the Catholic faith in different parts of the world. One example is Hallow, a Catholic prayer application. As illustrated by Camarines and Camarine (2022), the tool "enables users to personalize their prayer experience, connect with a prayer group, build a prayer habit, and even reflect on their prayers through an in-app journal" (p. 318). Hallow app has been lauded for improving a culture of mindfulness among Catholics. Singler (2024) asserted that Hallow is powered by AI features that contribute to its effectiveness. Nevertheless, the tools have some gaps or challenges, particularly related to harvesting personal data that may jeopardize privacy (Singler, 2024). Another faith-tech tool that has gained prominence within the Catholic circles is Abide. Abide is a mobile application that offers prayer content and Bible-led meditation via different digital platforms (Camarines & Camarine, 2022). Laird et al. (2024) focus on the Pray.com app, which existing evidence has shown to increase spiritual growth and improvement in physical and mental health among users.

Magisterium AI is another piece of innovation that continues to change the face of the Catholic Church. According to Pentin (2023), despite being in its infancy, the AI tool is specifically designed to facilitate Catholic teachings, ensuring that the church is accessible for all. In addition, it promises to enrich Catholic doctrines, homilies, and catechisms for children and parents. Questions and answers are offered in multiple languages, including English, French, Spanish, Portuguese, and German (Pentin, 2023). While it is still in its development stages, one major challenge is the likelihood of facing backlash from conservative Catholics who are not welcoming disruptive technologies such as AI. Another existing faith-tech innovation is VR in the church. Although there is no evidence regarding the adoption of VR in the Catholic Church, Jun (2020) explores the application of the innovation in other Christian doctrines, including its role in creating an all-inclusive environment for everyone. However, a major challenge associated with it is the likelihood of disrupting the traditional ecclesiastical order and diminishing the importance of fundamental Catholic elements such as the sacraments.

2.5 Acceptability Factors for VR

2.5.1 Sacramentality in VR

Foley (2021) argued the possibility of "virtual communion" as a feasible practice within Christian doctrine. In such a scenario, believers can assemble appropriate items, such as bread, crackers, wine, or grape juice, and partake of them at an appropriate time during the livestream (Foley, 2021). However, within the Catholic realm, this remains a contentious issue that may go against the sacramental expectations. The Catholic document "Pontifical Council for Social Communications: The Church and Internet" specifically talks about the pace of virtual tools within the Catholic faith. The document acknowledges the importance of VR tools in creating "virtual communities of faith" (*The church and Internet*, n.d.). Nevertheless, it cautions that VR cannot serve as a substitute for the real interpersonal community or "the incarnational reality of the sacraments and the liturgy" (*The church and Internet*, n.d.). Another Catholic document, "Constitution of the Sacred Liturgy: Sacrosanctum Concilium," promulgated by POPE PAUL VI, stresses the rigid tradition of the liturgical order. The document cautions that during the Eucharistic celebration, Christ's faithful should not be there as mere "strangers or silent spectators" (*Sacrosanctum Concilium*, n.d.). Instead, they must consciously participate with devotion and collaboration. Thus, while the present times call for change, the doctrine of the Catholic Church retains certain traditions or beliefs surrounding Eucharistic celebration that may cause resentment towards VR.

The Catholic Church, through theological and biblical justifications, has continued to challenge the sacramentality of virtual worship. Unlike the Protestants, the Roman Catholics believe that the bread and the wine transubstantiate, which means that these elements convert

and literally become the body and blood of Christ (Bare, 2020). For this reason, the physical presence of the congregants remains crucial. Other justifications are drawn from Colossians 3:15 and 1 Corinthians 12:14, which emphasize the oneness of the body of Christ (Bare, 2020). The Catholic Church uses these verses to stress the significance of corporate gathering as "the body does not consist of one member but of many" (1 Corinthians 12:14). Besides the Eucharistic celebration, the other essential area that has been subjected to doctrinal interpretation is the sacrament of penance or reconciliation. Researchers like Del Rio (2024) have argued that physicality is not an important requisite for the sacrament of penance. However, the Catholic document "Note from the Apostolic Penitentiary on the Sacrament of Reconciliation in the Current Pandemic," provides a different picture. The paper directs that even in times of the pandemic, the sacrament of reconciliation should be given in line with the existing universal law and other provisions outlined in *Ordo Paenitentiae* (*Note from the Apostolic Penitentiary on the Sacrament of Reconciliation in the current pandemic*, n.d.). Accordingly, this premise challenges any attempt to institute a paradigm shift that affects confession as is traditionally practiced, whereby the faithful and the priest physically interact.

Discussions regarding sacramentality, such as Foley's (2021) "virtual communion" and Bare's (2020) "oneness of the body of Christ," have significant business implications. These diverse assessments question whether VR can be competitively used as an alternative for physical worship without jeopardizing the cardinal principles of the Catholic faith. Answering this question can have a significant bearing on determining the success of this deep tech entrepreneurial venture.

2.5.2 The Meaning of Sacredness

The research on the adoption of VR liturgy in the Catholic Church necessitates an interrogation of what a sacred space entails. In explaining the meaning of a sacred space, Stump (2008) conceptualized it as "a religious component of the spatial imaginations of believers that takes different forms in different contexts" (p. 26). Several studies have connected physical features to the concept of sacredness. For instance, it has been established that being inside a physical setting such as a church or a monastery causes an individual to be emotionally and cognitively engaged and restored (Meagher et al., 2016). In another study by Bilewicz and Klebaniuk (2013), it was established that being in a setting with religious symbols not only provides a sense of sacredness but also reduces negative affect among individuals. This was further corroborated by Davis and Gatersleben (2013), who argued that specific features within the religious environment are closely associated with mystical experiences. Religious motivations emanate from ways in which individuals perceive their physical environment. For this reason, when designing a sacred environment, it is crucial to consider the aesthetic and functional elements of those who will eventually use it (Meagher

et al., 2016). Although these studies largely focus on the physical presence, the conceptual elements may also be applied to the virtual environment.

There is a need to interrogate whether the virtual environment can offer the much-needed sacred elements required within the Catholic faith. Larson-Miller (2022) interrogates the meaning of real presence within the context of virtually mediated sacramentality. The investigation by the authors affirms that sacramental theology requires a tangible presence that may not be achieved through virtual spaces (Larson-Miller 2022). The general perspective within the Catholic hierarchy is that the sacred cannot be achieved through VR. In a powerful argument, Beltramini (2025) asserted that the sacred cannot be achieved or controlled via human effort. Instead, the sacred is a function of "divine consecration" (Beltramini, 2025). In this regard, the sacred cannot be constructed within virtual spaces as is possible within physical settings. Although it is widely accepted within the Catholic faith that VR cannot replicate the sacred environment found in the physical setting, this does not mean that it does not have a place in religious practice. The author of the Catholic publication "Into the mystery: How virtual reality is reimagining Catholic evangelization," justified this by saying that VR cannot replicate the "richness of real, embodied life in the church" (*Into The Mystery*, 2025). Nevertheless, the author emphasized that it can serve as a conduit for creativity and encounter (*Into The Mystery*, 2025). Overall, the issue of sacredness is an essential variable in VR adoption as it tests whether congregants are ready to view the VR environment as spiritually meaningful.

2.5.3 Ethical Aspects

The resentment towards VR integration in the church could potentially arise from reasons outside theological and doctrinal confines. Ethical violation is a potential reason for the rejection of the technology within the realms of Catholic practice. The Catholic document "Catechism of the Catholic Church" Part 3 Article 4 discusses the morality of human acts. It stresses that human actions are subjected to evaluation and can either be good or evil (*Catechism of the Catholic Church*, n.d.). Likewise, the creation of a tailor-made VR for liturgical services could inadvertently cause negative effects on the church and its congregants. One potential area of ethics is privacy. Skulmowski (2023) argued that VR usage, especially among children, could increase the likelihood of manipulation, which eventually results in privacy issues, particularly in situations where intimate information is given up. In another research by Giaretta (2024), the authors identified that privacy issues can arise from multiple factors, most of which are security-related. VR faces multiple shortcomings in the security measures, which could lead to leakage of biometric data, loss of personal data, and third-party theft (Giaretta, 2024). Generally, Catholic adherents should be in a position to

safeguard their privacy, which remains a critical prerequisite for autonomy. Without this safeguard, the acceptability of or support for VR for liturgical services is likely to dwindle.

There are concerns that VR could also lead to health concerns among users. Spilka and SpilkaIs (2023) associated VR usage with cybersickness, a form of motion sickness that is often associated with nausea, disorientation, and a reduction in spatial awareness. Other short-term effects associated with the technology include eye soreness, focusing issues, and impaired hand-eye coordination (Spilka & SpilkaIs, 2023). These findings are further corroborated by Lundin et al. (2023), who associated VR usage with postural instability and fatigue. The authors further added that the negative experiences are more likely to eliminate the feeling of "presence" that is the hallmark of VR usage (Lundin et al., 2023). Besides the mentioned symptoms, research findings also associate VR usage with oculomotor disturbances (Simón-Vicente et al., 2024). This is a crucial ethical concern considering that the church environment is meant to offer spiritual and psychosocial benefits that contribute to the overall well-being of a person. Designers of VR that target the church demographic must remain aware of this ethical issue and work towards creating an innovation whose design elements minimize harm and maximize benefits to the users.

There is also a question as to whether equal access issues may arise from VR integration in the religious realm. On the one hand, researchers like Huang et al. (2023) contend that VR may widen the technology gap, especially across socioeconomic and generational groups. However, on the contrary, others like Zhang et al. (2025) assert that due to its widespread accessibility, VR technology can bridge economic and geographic gaps, fostering equitable opportunities. This premise holds more weight considering the arguments by Riva (2022), which show that VR is cheaper and thus more accessible to a wider array of individuals. Regardless, it is imperative for the designers of new and customized VR systems to ensure that the innovation does not widen the existing technological gaps in society today. There are also fears that VR could perpetuate the existing biases and stereotypes in society. You et al. (2024) argued that when VR is not designed with inclusivity in mind, it risks amplifying social biases inherent in a person. Consequently, this could impact resentment among minority groups, leading to unequal usage or access.

VR for ethics is particularly significant given that adherence to moral values can lead to positive entrepreneurial implications. The privacy-related issues discussed by Giaretta (2024) increase risk perception, which can affect the acceptability and demand of the product, with trust serving as the mediator. The inclusivity concerns raised by You et al. (2024) may raise issues regarding its institutional adoption due to its potential to cause intergenerational divisions.

2.5.4 Ecclesiology

Another significant concept that may influence acceptability is ecclesiology. Mans and Rousseau (2024) defined ecclesiology as "the study of the church, where theology is applied to the nature and structure of the Christian church" (p. 212). In the last few years, a new concept known as digital ecclesiology has emerged within the Christian faith. The concept can refer to multiple things, including the clarion call for churches to use digital media in their endeavors or as a framework to highlight the opportunities and challenges associated with incorporating the Internet into worship (Campbell, 2020). Overall, digital ecclesiology recognizes the significance of modern innovation in pastoral support and ministerial work as a form of liturgical enhancement that triggers individuals to reimagine their worship environments (Campbell, 2020). The last concept is theological anthropology. Klaiber (2024) viewed theological anthropology as a strategy to create the human story through the lens of the divine power of God. It is an attempt to conceptualize human nature in light of the divine revelation (Klaiber, 2024). As illustrated by Klaiber (2024), theological anthropology may provide the much-needed foundation for understanding the place of new technologies, such as AI, in either enhancing or deteriorating the human person and their relationship with God.

In summary, the acceptability factors (sacramentality, sacredness, ethics, and ecclesiology) are determinants of whether the church can adopt deep tech technologies, particularly disruptive ones like VR. Evaluating VR using these lenses allows entrepreneurs to gauge demand and market potential. Moreover, it gives them valid ideas on how to design the technology in ways that preserve the fundamental tenets of the Catholic religion.

2.6 Design Features in Deep Tech

Design features are essential in influencing the acceptability of deep tech tools. One of the most fundamental design factors is aesthetics. According to Wei et al. (2025), aesthetics not only influences acceptance but also the adoption of technological devices. Aesthetically appealing products often cause a sense of appreciation and delight among customers when engaging with a given product due to the associated sensory appeals (Wei et al., 2025). Besides aesthetics, there is also a fundamental component known as the human-centered design. Here, designers of technologies focus on humanistic aspects when designing technologies. Focus is placed on the needs, motivations, and challenges of the people (Tandon et al., 2024). Tandon et al. (2024) presented evidence to show that applying the human-centered design principle improves technological acceptance and adoption in the healthcare sector. Research has also demonstrated the significance of implementing ethical values in the design of technologies. For instance, integrating transparency in the design has been shown to improve not only trust and satisfaction but also the perception of usefulness and ease of use (Hein & Diefenbach, 2025).

Another fundamental design feature is system security. There is evidence showing that users are more inclined to technological systems that safeguard their security. For instance, one business-related study showed that security is arguably the most significant factor influencing the adoption of m-commerce technologies (Hassan & Ajloun, 2023). Furthermore, this security includes cybersecurity features that make it difficult for one to be infiltrated by malicious individuals remotely (Grobler et al., 2021). Besides security issues, ease of use is another critical factor that can influence the acceptability of deep tech technologies. Ease of use is a foundational concept in the TAM theoretical model. It is defined as the likelihood that using a technology will attract little to no effort (He et al., 2018). The concept of ease of use is particularly essential when targeting the older generation, who may not be as tech-savvy as their younger counterparts. Some researchers also focus on cultural elements such as language when designing technological interfaces. Kreienbrinck et al. (2025) asserted that modern technologies are fitted with machine translation applications that enable individuals to access content in different languages.

Overall, design features are important in this study because they interrogate elements that make technological innovations appealing to the target market. By integrating these factors, deep techs gain a competitive edge through trust, dependability, and efficiency. More importantly, design factors will shape how innovators create deep tech tools that capture the aspirations of different markets (e.g., old vs. young), expanding the market potential.

2.7 Challenges of VR in the Catholic Church

Several authors have evaluated the potential challenges of VR integration within the church. Sugianto et al. (2023) asserted that in VR worship, avatars will stand in place of humans. However, there is a high likelihood that the individual profile will differ from the avatar's identity, leading to a potential mismatch (Sugianto et al., 2023). In addition, some individuals are likely to consider worship in VR spaces less solemn than in physical spaces. If implemented, there is a chance that VR will contribute to the technological divide among the faithful. The existing digital divide in society is influenced by factors such as socioeconomic status and age (Yang et al., 2024). VR integration in the church is likely to exacerbate the existing divide due to its resource-intensive nature (Huang et al., 2023). Furthermore, it is worth noting that the elderly may not have the requisite skills to use the VR technologies, increasing the digital divide between the young and the old. However, some authors, such as Jun (2020), contend that VR is more inclusive and may offer liturgical opportunities for participation to a wide range of people. The potential for exclusion goes against the values of the Catholic Church, whereby the Internet or the digital space is viewed as a conduit to access everyone, not just a few. Thus, besides the theological and ecclesiological aspects, VR is likely to introduce social ills that may not align with the church tradition.

Researchers have paid considerable attention to cost as a potential barrier to VR integration in the church setting. Fernández-Sotos et al. (2020) asserted that VR is costly to develop and requires experts to manage it. This was also observed by Taufik et al. (2021), who argued that VR was very expensive, especially in the early stages, leading to limited consumer applications. Regardless, over time, it has become increasingly available to the user and more manageable in terms of cost (Taufik et al., 2021). This finding was further corroborated by Riva (2022), who argued that in the initial stages, a VR system would cost around 10,000 USD. Over the last few years, the technology has quickly evolved, and now VR has been reduced to a simple system characterized by a standard smartphone and a display for purposes of generating a 3D environment (Riva, 2022). As a consequence, the VR system now costs between 15 and 20 USD (Riva, 2022). This remarkable reduction in price has facilitated the widespread integration of VR into diverse fields. Thus, there is a high likelihood that cost may not be a significant barrier in the implementation of VR in liturgical services.

Overall, challenges of VR predict some of the factors that may adversely affect acceptability and demand. It equates to product barriers or shortcomings that developers have to overcome in order to create an appropriate deep tech tool that meets the needs of the target audience. More importantly, the shortcomings identify market opportunities that can be exploited in a bid to create a competitive product.

2.8 Market Potential and Business Opportunities

2.8.1 Non-Liturgical Uses of VR

Few researchers have explored the potential for using VR for other non-liturgical purposes, such as religious education and marriage preparation, among others, within the church setting. There is evidence that VR can be effectively integrated into religious education. Aukland et al. (2024) argued that VR comes with the aspect of 360-imaging that can enable learners to explore religion and worldview in special ways. In addition, through the power of participatory observation, it is possible for learners to internalize key religious concepts in a manner that is meaningful to them (Aukland et al., 2024). Żammit (2023) used a secularized lens to evaluate the significance of VR as an effective tool for teaching, with the results showing a positive impact. Although there is a lack of a direct study focusing on VR and catechism, evidence from the two sampled studies predicts that VR could be effective in catechism. Furthermore, there is evidence that VR can be used in church meetings, pastoral care, worship, and other non-liturgical endeavors. This is because the VR environment is highly immersive and supports sounds, voices, and individuals can turn around 360 degrees in the 3D space (Adria, 2024). As such, this enables individuals to sit in proceedings, ritual meetings, and gatherings that require engagement either in dyads or small groups (Adria,

2024). Therefore, despite its controversial pick for liturgical services, VR still has a central role within the church setting.

2.8.2 Monetization Models for Virtual Worship

There is a need to assess various ways in which the demographic in Nigeria can pay for the VR services in a manner that is convenient for both the customer and the entrepreneur. One of the most common payment methods is through a subscription model, which has primarily been used in VR tools in the healthcare sector (Chung et al., 2022). The subscription-based business model is becoming common in virtually every type of business. According to Ma and Chang (2024), the subscription model is revolutionizing the market by eliminating the conventional one-time payment and enabling entrepreneurs and customers to establish long-term relationships. Another creative business model that could be explored is the tiered membership. Although the tiered model is yet to be explored in VR, it offers entrepreneurs a chance to differentiate their services depending on quality and cost (Fu et al., 2018). For instance, one option may include offering basic vs. premium services, distinguished by cost.

2.8.3 Market Demand Dynamics

The literature review has extensively covered some of the theological and ecclesiastical factors that may influence VR adoptions among the Nigerian Catholics. In addition, it is crucial to evaluate other fundamental business-related factors. Demographics is arguably one of the most essential factors that affect VR adoption. One research found that VR is highly popular among members of the Generation X demographics (Surugiu et al., 2025). However, it was established that use is primarily restricted to entertainment, education, and marketing. Regardless, evidence from one systematic review showed that VR applications are becoming popular among the elderly population, particularly within the realm of healthcare (Baragash et al., 2022). Another market dynamic shaping VR adoption is cost. As illustrated by Joselin and Students (2025), VR tools or applications have become affordable over the last few years. Nonetheless, the constant desire for high-end graphics and external tracking systems can increase costs, especially in the long run.

In summary, market potential remains a significant theme given its direct association with the entrepreneurial lens taken by this study. By evaluating the various ways in which this product can be channelled into the market, business personnel can brainstorm new opportunities within the market. Understanding the market dynamics offers entrepreneurs the knowledge needed to effectively and efficiently use resources.

2.9 Literature Gap and Research Contribution

Few studies focus on the integration of deep-tech tools such as VR, especially in the Nigerian Catholic context. Furthermore, the topic of deep-tech technologies, viewed from an entrepreneurial lens within the religious context, is still new. As such, few credible studies have

relevant information that could be subjected to a literature review. Also, the conservative nature of the Catholic Church means that technological innovations are often approached with great caution. In this regard, deep-tech's potential in faith remains a largely unexplored area. Nevertheless, the research contributes to the literature by assessing the intersection between theology and entrepreneurship, using deep-tech tools as the product. Therefore, this offers practical insights for deploying faith-tech platforms that respect liturgical traditions and foster innovation.

In summary, the literature review has explored all the major themes related to the research question and objectives. Based on the reviewed studies, digital innovation, particularly in the faith-based area, continues to infiltrate the Catholic Church. While the church is still conservative in its ways, the significance of these technologies cannot be ignored. The study is novel in its approach as it attempts to evaluate the compatibility between faith-tech tools and the existing ecclesiastic order using an entrepreneurial lens. The research has several gaps worth acknowledging, including the under-exploration of deep-tech tools such as VR within the Catholic spectrum.

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CHAPTER 3: METHODOLOGY

3.1 Role of the Researcher

In the study, the researcher had several fundamental roles worth identifying. As a mixed-method study, the primary role of the investigator was to collect both qualitative and quantitative data. The first step encompassed creating the semi-structured interview template, survey questions, and an accompanying informed consent form for the research. The subsequent step focused on identifying the participants, which in this case included lay faithful, theologians, and clergy. The researcher was also responsible for seeking approval from the Institutional Review Board (IRB) to ensure that the study aligned with the ethical requirements.

3.2 Research Philosophy and Approach

Research philosophy encompasses a set of assumptions and beliefs that guide research. It focuses on aspects such as the fundamental perspective on the nature of reality, including how it is constructed or developed (Alharahsheh & Pius, 2020). This research utilized both a positivist and an interpretivist approach. In positivism, truth is generated from objective methods, often statistical or empirical processes (Alharahsheh & Pius, 2020). However, in interpretivism, the opposite is true. Truth or reality is a consequence of individuals' subjective interpretation of the phenomenon around them (Alharahsheh & Pius, 2020). Therefore, while different approaches are used, combining the two philosophies can improve the quality of the research findings.

3.3 Research Design: Mixed-Methods Justification

In mixed-methods studies, the researchers utilize both qualitative and quantitative methods. Qualitative methods align with the interpretive philosophical approaches, while quantitative methods follow the positivist assumptions (Alharahsheh & Pius, 2020). According to Wasti et al. (2022), a mixed-methods approach has better methodological rigor than either a qualitative or a quantitative method conducted independently. As such, the quality of data and outcome in a mixed-methods approach is inherently better. This research uses an entrepreneurial lens to understand the feasibility of integrating VR liturgical tools within Nigeria's Catholic faith. Due to the novelty and multifaceted nature of the study, a single methodological approach may not suffice. Using both subjective and objective methods is essential in gathering large and diverse sets of data that enable an in-depth assessment of the research problem, which captures diverse elements, such as acceptability, market potential, and design elements.

3.4 Qualitative Methods

The qualitative section consisted of an interview with 20 participants, including Nigerian lay faithful, theologians, clergy, church members, Catholic sisters, and tech developers/entrepreneurs. The recruitment process began with the identification of the

parishes, seminaries, and Catholic student associations in Nigeria. The invitation to participate was sent via the university's online groups. Due to the relatively smaller number of participants needed, a purposive sampling technique was used to select the most appropriate subjects who had the knowledge and experience to provide meaningful insights into the research problem. Ten semi-structured interview questions were asked in person or via Zoom, depending on the accessibility of the participant (See Appendix A). Each interview was expected to last between 30 and 45 minutes. A digital audio recorder was used to capture the raw interviews. The researcher also took notes as backup.

3.5 Quantitative Methods

In the quantitative phase of the study, surveys were distributed online via Google Forms or Qualtrics. Unlike the interview, which incorporated 20 participants, the survey aimed for a larger participant group, comprising 171 participants, which included lay faithful, seminarians, theologians, and clergy. A total of 15 Likert questions were asked, where participants had 5 response options, including "strongly disagree," "disagree," "neutral," "agree," and "strongly agree" for most questions (See Appendix B). The survey questions focused on 3 fundamental areas: familiarity and spiritual perceptions, acceptability and participation, and entrepreneurial and design perspectives.

3.6 Sampling Strategy

Identifying the research population is an essential step in the research process. Shah (2023) defined the study population as a group that the researcher has an interest in studying. The researcher can acquire a sample from the population. This study targeted lay faithful, seminarians, theologians, and clergy in all 7 dioceses in Eastern Nigeria, including Enugu, Abakaliki, Nsukka, Nnewi, Ekwulobia, Awka, and Okigwe. Considering a wider population base was essential in acquiring diverse perspectives.

After identifying the study population, the next part of the research was sampling. Ahmed (2024) asserted that through sampling, a subset of the participants is selected from the population. Sampling is arguably one of the most fundamental procedures in a study because the nature and generalizability of the outcomes depend on it (Ahmed, 2024). This study applied a non-probabilistic sampling approach. Non-probabilistic techniques are utilized when randomization is neither practical nor feasible (Ahmed, 2024). One shortcoming associated with the non-probability sampling techniques is the poor generalizability or external validity.

The non-probabilistic sampling technique used for this study was purposive sampling for the interview and snowballing for the survey. According to Campbell et al. (2020), purposive sampling entails the deliberate selection of research participants. It is an effective method that ensures that only credible individuals are included in the study. Moreover, due to its

intentionality, it ensures that diverse stakeholder inclusion is achieved. However, the lack of randomness increases the risk of bias.

In this research, purposive sampling was useful for several reasons. Firstly, it ensured that only participants who met the inclusion criteria were incorporated into the study. Secondly, this method was particularly important for the qualitative part, since in-depth insights were needed during the data collection phase. As such, it was essential that the sampling technique was deliberate enough to guarantee that the resultant subjects had the requisite knowledge on the subject.

For the survey, a snowballing technique was used to sample the participants. According to Ahmed (2024), this sampling technique is more useful when studying hard-to-reach or hidden populations. In general, surveys require a larger sample than interviews. Finding the right sample size from a foreign country may present significant logistical challenges, thereby necessitating snowballing. In snowballing, the few participants who have been sampled are tasked with the responsibility of reaching out to other potential subjects who meet the inclusion criteria (Ahmed, 2024). In this study, the participants who were sampled purposefully for the interviews were used to suggest referrals, creating a network of eligible participants.

3.7 Research Participants

The first strategy was to develop eligibility criteria for the participants to ensure the inclusion of subjects that are meaningful to the research objectives. For a participant to be included in the study, they had to be in one of the following categories: lay faithful, seminarians, theologians, or clergy in the Nigerian Catholic church. The participant must have attained the age of 18, be a regular church attender, and have deep knowledge of the fundamentals of the Catholic faith. Since the study interrogated fundamental aspects of Catholic doctrine, lay faithful were required to have received a thorough religious education (catechesis) at least until the Confirmation stage. For clergy members, they needed to have served in their current diocese for at least a year. More importantly, participants were required to demonstrate the willingness to participate without coercion.

3.8 Instrumentation

The first tool that was used for this study was a semi-structured interview template. These tools have predefined questions that also allow the participant and the researcher to explore topics with great flexibility. The open-ended responses are essential in collecting large amounts of data from the subjects. Adeoye-Olatunde and Olenik (2021) argued that a semi-structured interview template has several benefits. Firstly, it ensures that the interview remains focused and in line with the research objectives. Secondly, a semi-structured interview offers the investigator the chance to explore emerging ideas that may crop up in the course of the

conversation with the interviewee (Adeoye-Olatunde and Olenik, 2021). Despite their effectiveness, semi-structured interviews are likely to experience some challenges worth noting. Examples include a lack of an appropriate guide and failure to elicit follow-up questions (DeJonckheere & Vaughn, 2019). Also, without an appropriate guide, it is highly improbable that the conversation will yield relevant data that is meaningful for the study.

The second instrument that was used is a survey with Likert questions. The Likert scale is one of the most widely adopted scales in social sciences and other disciplines. They entail a situation where responses are measured on a continuum of two endpoints (Heo et al., 2022). The tool is essential in gauging the subject's degree of agreement or preference. As was used for this research, a typical Likert scale comprises a five-point scale that ranges from "strongly disagree" to "strongly agree." In between, there are three intermediate responses, including "disagree," "neutral," and "strongly agree" (Koo & Yang, 2025). Some limitations associated with the Likert scale include the potential for response bias, whereby participants avoid extreme categories or tend to agree with selections that do not necessarily align with their beliefs (Koo & Yang, 2025). Despite these shortcomings, the Likert scale remains a standardized and versatile tool for empirically capturing the perceptions, opinions, and attitudes of respondents.

The research also relied on a digital voice recorder to capture interview data. The video recorder has fundamental roles beyond just capturing the audio details. It contributes to the authenticity of the research by ensuring that the information is captured verbatim (Rutakumwa et al., 2020). This is particularly essential in guaranteeing authenticity and eliminating bias in the research. In addition, recording the interview using a voice recorder is the first step towards creating a transcript.

The NVivo Transcription application was also an important instrument for this research. The application is known for creating fast and accurate transcripts that align with the content. In addition, it is easily accessible and can be used on both mobile and desktop devices without the need to download special software.

3.9 Data Collection Procedure

In the qualitative phase, the process began with the development of the interview questions listed in Appendix A. The questions were subjected to a panel of experts to ensure that they were relevant and that they aligned with the research question. Most of the interviews were conducted via Zoom due to the geographical dispersion of the participants. Due to the logistical challenges, only a handful of interviews were conducted in person. Participants completed an informed consent form to ascertain that they were aware of the aims and objectives of the study, including any benefits and risks. Each interview took a minimum of 30

minutes and a maximum of 45 minutes. An audio recorder backed by written notes was used for recording purposes.

Due to the desire to compare groups, there was a need to maintain independent data sets. For this reason, the 171 participants who took part in the survey were inherently different from those who were contacted for the interview. The surveys were completed online via Google Forms or Qualtrics. Various distribution channels were used, including email lists from church institutions, social media, QR codes, or links shared after mass or in newsletters. The participants were encouraged to respond to all the questions and only select one entry on the Likert scale.

3.10 Data Analysis Techniques

3.10.1 Coding and Thematic Analysis

After the interview data were collected, the next phase encompassed data transcription and cleaning. The NVivo software was instrumental in this process. The first part of the coding encompassed the open-coding process. As illustrated by Coates et al. (2021), the open coding process entails the identification of the main ideas. The transcript was read line-by-line, with codes being generated based on the recurring ideas relevant to the research questions. This was then followed by axial coding, whereby the initial codes from the open-coding process were pieced together to establish deeper relationships (Im et al., 2023). During this process, similar codes were also collapsed to create a deeper narrative. The last part of the coding process was selective coding, which was done to identify the major patterns from the generated ideas. Throughout the process, comparisons were made across various groups, including clergy, theologians, lay persons, and entrepreneurs, to uncover any similarities or differences in perspectives. After the process of refining, the codes were then organized into broader themes, which established the foundation for thematic analysis. Overall, an inductive approach was utilized as a logical model. According to Im et al. (2023), an inductive approach to coding takes a bottom-up framework, whereby raw data is processed to generate themes. The role of the coder was to assign themes and labels.

3.10.2 Descriptive Statistics

In the quantitative phase, descriptive statistics were used as the primary analytical method. The descriptive statistics summarized and described the responses from the survey. It captured the frequencies and percentages of responses for each question and also summarized the measures of central tendency, such as mean (average rating per item), median (middle response), and mode (most frequent response). The standard deviation was further included to appreciate the variability in opinions. Overall, Descriptive statistics—including frequencies, percentages, means, and standard deviations—were used to capture respondents' attitudes toward VR liturgy across all 15 Likert-scale items.

3.11 Ethical Considerations

Ethics remains a significant part of any research that involves human participants. Before the study was conducted, an Institutional Review Board (IRB) was sought. Afterwards, attention was placed on pertinent aspects such as informed consent, privacy, confidentiality, and cultural sensitivity.

Prior to participation in the interview or survey, participants were issued an informed consent form, which they were expected to fill out (See Appendix C for informed consent). The document invited participants into the study by delineating the scope of the research, including its goals and objectives. The informed consent further identified the benefits and risks related to the research study. More importantly, the voluntary nature of the study was emphasized, as participants had the liberty to stop their involvement at any stage.

Besides the informed consent, this study made concerted efforts to ensure that privacy and confidentiality were top-notch considerations. Identifiers were removed from both the interview and survey responses. Instead, pseudonyms were used in place of real names. The interview responses and the transcripts were stored in a private and secure place, with appropriate cybersecurity interventions being taken to prevent possible theft or interference. The interviews, including those conducted via Zoom or in person, were done in a private setting, whereby each individual had the opportunity to express themselves without fear.

Furthermore, while interacting with the participants, deliberate efforts were made to ensure that cultural sensitivity was prioritized. Bobel et al. (2022) defined cultural sensitivity as "The ability to recognize, understand, and react appropriately to beliefs, values, norms, and behaviors of persons who belong to a cultural group that differs substantially from one's own" (p. 371). Religion remains one of the most critical elements of culture. When approaching the Catholic faithful, it was essential to design the questions in a manner that is respectful to the people and their spiritual order. Prior research was done on the ecclesiastical order and all the relevant laws governing the creed to avoid any question that may seem insensitive to the participant.

3.12 Validity, Reliability, and Trustworthiness

Validity, reliability, and trustworthiness are essential parts of ensuring that research remains credible and accurate. Ahmed and Ishtiaq (2021) provided the distinction between validity and reliability by stating, "Validity is about what an instrument measures and how well it does so, whereas reliability concerns the truthfulness in the data obtained and the degree to which any measuring tool controls random error" (p. 2401). Expert reviews for both the interview and the survey were crucial in strengthening the validity of the content. Member checking was another intervention that was used to ascertain the validity of the research. According to Vella (2024), in member checking, the data or outcomes are returned to the

participants, allowing them to assess their accuracy or whether they truly align with their experiences. Interview transcripts and survey responses were returned to the participants for confirmation. This not only strengthened the outcomes' credibility but also provided the basis for improving the internal validity.

3.12.1 Pilot Study

A pilot test was done to strengthen the reliability of the survey. As a rule of thumb, it is estimated that about 10% to 20% of the participants should be used for the pilot study (Bujang et al., 2024). Prior to the study, 17 (approximately 10%) participants were asked to participate in the pilot study, whereby they responded to the survey questions and sent them back. Participants included 3 clergy, 5 lay persons, 2 theologians, and 7 seminarians. Feedback was gathered on question clarity, length, and ease of understanding. Specifically, participants were asked to identify any ambiguity in the items or technicalities in accessing the online forms. Comments regarding the question length and sensitivity were also welcomed. The feedback that was received was used to shape the final wording of the survey questions, enhancing flow, clarity, and cultural relevance. Overall, this improved the survey's validity.

3.12.2 Scale Validation

The goal of scale validation is to prove that the scores from the instrument will capture the intended target (McNeish et al., 2025). A scale study was conducted to ensure that the survey measured the intended constructs related to acceptability, market potential, and the design elements. The Cronbach's alpha was used to examine clarity, reliability, and internal consistency (Taber, 2018). With Cronbach's alpha, it is possible to determine how multiple survey items can measure an underlying construct. Generally, a good alpha value should be above ≥ 0.70, which indicates a good internal consistency (Taber, 2018). Table 1 provides the Cronbach's alpha reliability results for the survey subscales.

Table 1

Cronbach's alpha reliability results for survey subscales

Survey Section	**Number of Items**	**Cronbach's Alpha**	**Interpretation**
Section A: Familiarity & Spiritual Perceptions	5	0.78	Acceptable internal consistency
Section B: Acceptability & Participation	5	0.84	Good internal consistency
Section C: Entrepreneurial & Design Perspectives	5	0.81	Good internal consistency

3.12.3 Triangulation

Triangulation was used as the basis for enhancing the study's trustworthiness. Arias Valencia (2022) defined triangulation as the combination of multiple methods in investigating the same event, object, or phenomenon. Data from the interviews and the surveys were compared side by side for cross-validation purposes. For instance, surveys (quantitative) and interviews (qualitative) were used to explore attitudes toward VR in liturgy. Then, the researcher compared whether the themes from interviews supported or explained the patterns in survey responses. Catholic Church documents were also consulted to ensure that the sentiments given by the participants aligned with doctrinal principles. Comparing insights across these three data sources allowed the researcher to confirm consistent patterns.

3.12.4 Operationalization of Variables

This section identifies the constructs or variables and their conceptual and operational definition. It also captures the indicators measured. Table 2 provides the detailed information on the operationalization of the study variables.

Table 2

Operationalization of study variables

Construct/Variable	Conceptual Definition	Operational Definition	Indicators (What is measured)	Survey Items
Familiarity with VR	Awareness and prior exposure to virtual reality technology.	The respondent's self-reported level of knowledge about VR.	Level of familiarity	Item 1
Spiritual perceptions of VR	Beliefs about whether VR can maintain the sacredness, reverence, and authenticity of liturgy.	Agreement with statements about VR preserving liturgical meaning.	Perceived sacredness, comfort, physical presence, and the importance of perceived community	Items 2–5
Acceptability of VR liturgy	Willingness to adopt or participate in VR-based worship services.	Respondent's readiness to attend, support, or recommend VR liturgy.	Willingness to attend, perceived usefulness, recommendation, ethical fit, appeal to youth	Items 6–10
Market potential/adoption intent	Likelihood of audience purchasing or subscribing to VR liturgy platforms.	Responses on interest in buying, subscribing, or supporting VR-	Purchase intention, collaboration support, and business opportunities	Items 11–13

		based solutions.		
Design expectations	User preferences regarding design features necessary for VR adoption.	Agreement with statements on desirable design elements and privacy requirements.	Avatars/visuals, user-friendliness, privacy/confidentiality	Items 14–15

3.13 Limitations of the Methodology

The methodology presented several limitations worth noting. Among them were generalizability issues, dishonesty in interview responses, and the complexity of conducting a mixed-methods study. This section will critically address these shortcomings.

Generalizability is an essential aspect of research. It addresses whether the research outcomes apply to the broader population from which the sample was derived. Nigeria has millions of Catholic faithful. It is highly unlikely that the sentiments of 191 (171 +20) participants will reflect the views and beliefs of the broader Catholic population. The generalizability is further complicated by the fact that purposive and snowballing sampling techniques were used rather than a method that utilizes some form of randomization. Therefore, this means that the external validity of the research is adversely affected due to the introduction of bias.

Dishonesty in the interview responses is another significant challenge that is likely to be experienced. As previously noted, interviews are founded on an interpretive philosophy, whereby truth is viewed from a subjective perspective. As such, responders are likely to provide inaccurate responses that do not necessarily reflect their views or perspectives. On some occasions, biases could arise from the way the researcher shapes the question. Furthermore, a special type of bias known as response bias encompasses a situation whereby the participant gives answers they think are expected or socially acceptable but not their true thoughts (Hendrix et al., 2024). Due to the malleability of human memory, interviewees are likely to demonstrate recall bias. Thus, amidst all these scenarios, using an interview as one of the data collection interventions risks jeopardizing the accuracy of the results.

Finally, this study uses a mixed-method approach whereby qualitative and quantitative methods are conducted separately and then triangulated. Compared to most other designs, mixed-methods studies require additional skill sets, especially in the integration phase. In addition, individuals need extra time for data collection and analysis (McKenna et al., 2021). In some cases, mixed-methods studies generate large datasets that result in challenges associated with analysis and dissemination.

3.14 Summary

This chapter lays the foundation for the methodological processes that were used in the research. Both qualitative and quantitative data were systematically collected and analyzed in accordance with the best practices. Ethical considerations, including factors such as privacy, confidentiality, informed consent, and cultural sensitivity, took prominence. The researcher paid attention to ensure that the research procedures and the associated instruments were valid, reliable, and trustworthy. Limitations such as response accuracy, generalizability issues, and mixed-methods complexities were also addressed.

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CHAPTER 4: RESULTS AND ANALYSIS

This chapter summarizes the results from the mixed-methods analysis. It begins with quantitative data, focusing on the descriptive analysis of the demographics and the survey responses. In the qualitative phase, the interview responses from the participants are coded before the relevant themes are identified based on the recurring ideas.

4.1 Descriptive Analysis

4.1.1 Demographics

4.1.1.1 Gender Distribution. A total of 102 participants were female, while 69 were male. The sampling was in line with global and country-level (Nigeria) statistics that show that female church membership or attendance is traditionally higher than that of males (Murphy, 2016). Table 3 captures the information on gender distribution.

Table 3

Gender distribution

Gender	Participants	Percentage
Male	69	39.7%
Female	102	60.3%
Total	171	100%

4.1.1.2 Age Distribution. Exploring the age distribution is essential as it helps in understanding the generational perspectives on digital platforms and VR technology for religious purposes within the Nigerian Catholic spectrum. As illustrated in Table 4 and Figure 1, the majority of respondents (46.3%) fall within the 25-34 age range, suggesting that a significant portion of the survey participants are younger adults. The age group 18-24 follows with 18.9%, while older age groups (35-44, 45-54, and 55+) make up a smaller proportion of the respondents.

Table 4

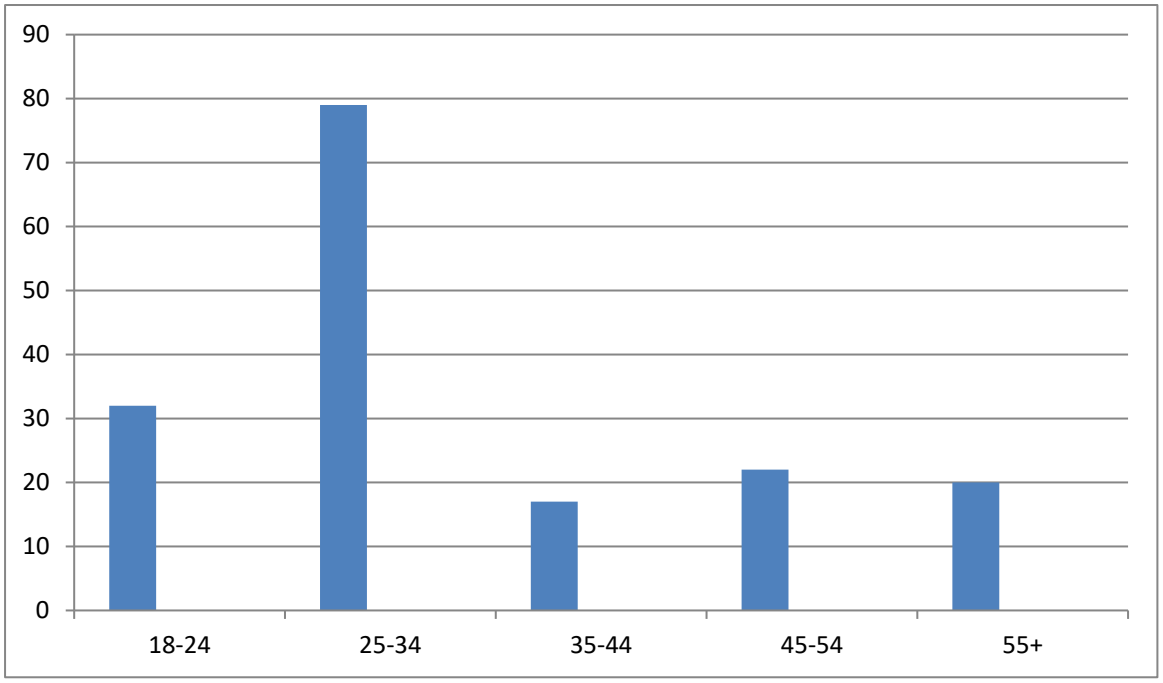
Age distribution

Age Group	Count	Percentage
18-24	32	18.9%
25-34	79	46.3%
35-44	17	10.0%
45-54	22	12.9%

55+	20	11.7%

Figure 1

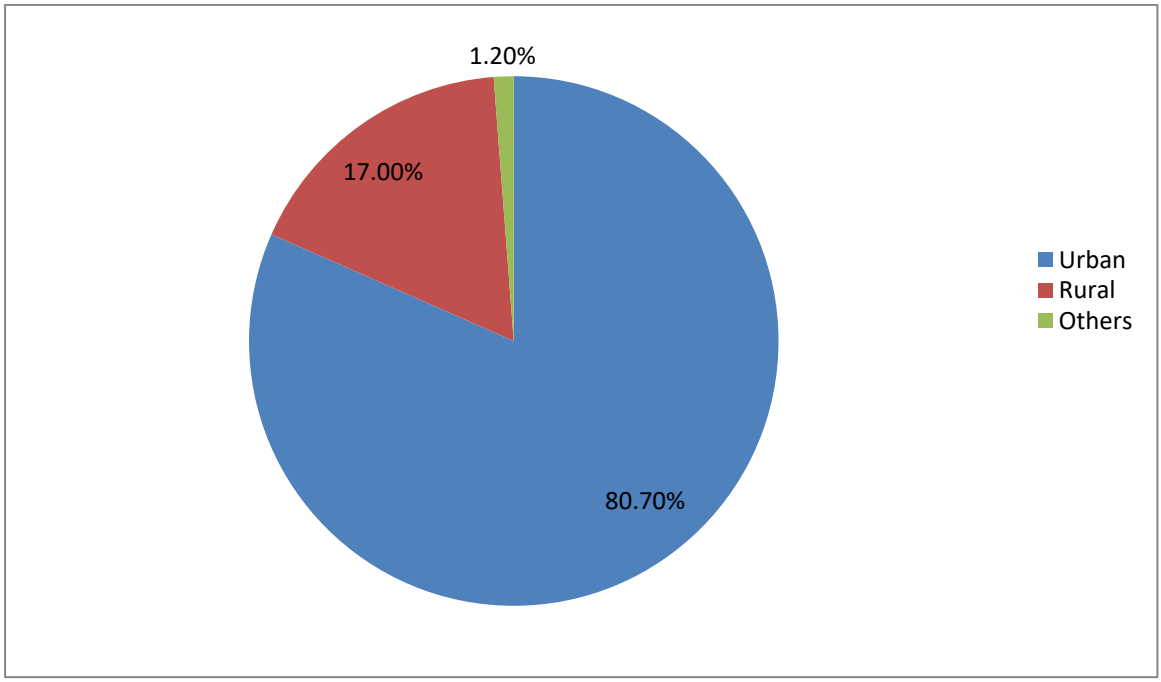
Bar graph showing age distribution



4.1.1.3 Urban/Rural Distribution. This distribution indicates the geographical locations of the respondents, which is vital for understanding the impact of access to technology and the potential for VR adoption in different areas. The survey shows a clear dominance of urban respondents (80.7%), with a smaller proportion of rural regions (17.0%) and an additional 1.2% categorized as "Other" (Figure 2). This reflects the higher access to digital technologies in urban areas, which could affect the familiarity and openness to VR tools in religious practices.

Figure 2

Geographical distribution of participants



4.1.2 Familiarity and Spiritual Perception

With regards to familiarity and spiritual perception, 5 Likert scale questions were asked as illustrated in Table 5. The Table captures the mean, median, mode, and standard deviation.

Table 5

Descriptive statistics: Familiarity and spiritual perception

Question	Mean	Median	Mode	Standard Deviation
1. How familiar are you with Virtual Reality (VR) technology?	2.42	2	3	1.05
2. I believe the sacredness of liturgy can be preserved in a virtual environment.	3.05	3	3	1.33
3. I feel comfortable participating in	3.50	3	3	3.88

spiritual or communal activities using digital platforms.				
4. Physical presence during the liturgy is essential for a meaningful worship experience.	3.32	3	3	1.29
5. I believe VR can replicate the sense of community and reverence found in physical liturgy.	3.27	3	3	1.31

The survey tested the participants' familiarity level with the VR technology. With a mean of 2.42, the average familiarity is between 2 and 3. A standard deviation of 1.05 indicates a moderate spread of responses. A median of 3 demonstrates that most respondents are somewhat familiar with the technology.

Furthermore, respondents were asked whether they believed that the sacredness of the liturgy could be preserved in a virtual environment. As in Table 3, a mean of 3.05 indicates that on average, respondents are neutral to agreeing that sacredness can be preserved in the VR environment. A standard deviation of 1.33 shows that there is a wide range of opinions among the respondents. A median of 3 indicates that the central tendency is neutral.

Participants were asked whether they felt comfortable participating in spiritual or communal activities using digital platforms. With a mean of 3.50, responses are leaning towards comfort rather than discomfort. A standard deviation of 3.88 demonstrates large variability in comfort levels. A median of 3 indicates a neutral comfort level.

The research also inquired whether physical presence during liturgy is essential for a meaningful worship experience. A mean of 3.32 is slightly above neutral, showing that most participants lean towards the agreement that physical presence is vital. A standard deviation

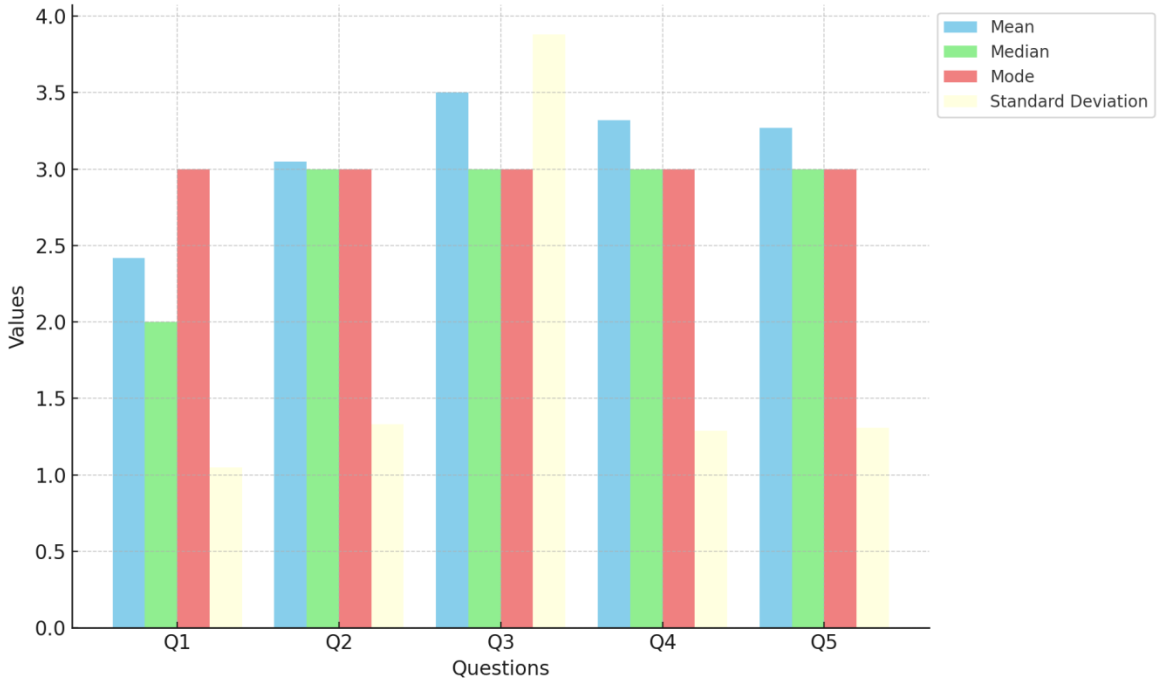
of 1.29 indicates moderate variability. A median of 3 shows that participants are neutral on the importance of physical presence during liturgy.

Lastly, participants were asked whether VR can replicate the sense of community and reverence that is often associated with physical liturgy. A mean of 3.27 indicates a slightly above average attitude that VR can replicate community and reverence. A standard deviation of 1.31 indicates moderate variability of responses. A median of 3 indicates a neutral response.

In summary, the descriptive analysis with regard to familiarity and spiritual perception shows that familiarity with VR is moderate, as the mean and median suggest that respondents are somewhat familiar but not very comfortable. Furthermore, the belief in preserving sacredness in VR is fairly neutral, with some agreeing that it can be maintained, while others remain neutral or disagree. Comfort with using digital platforms is also neutral, with some participants expressing discomfort. The idea of attending a VR liturgy is met with neutral to slightly positive willingness. The importance of physical presence in worship and the ability of VR to replicate sacredness are met with moderate agreement. On business opportunities and collaboration, there is a slight leaning towards agreement that VR could be beneficial in the church, but opinions vary. Figure 3 summarizes the descriptive statistics related to familiarity and spiritual perception.

Figure 3

Summary of descriptive statistics: Familiarity and spiritual perception



4.1.3 Acceptability and Participation

Several related questions were asked to test the acceptability of VR within the liturgy experience, as illustrated in Table 6. The average response for all the questions lies between 3.08 and 3.44, indicating that respondents are generally neutral to agreeing on the acceptability of VR-based liturgies and their potential benefits. The standard deviation ranges from 1.28 to 1.39, showing moderate variability in the responses. The median for most of the questions is 3, suggesting that many respondents were neutral in their responses. However, the mode is higher for several questions (e.g., Question 6 with a mode of 5, indicating that a significant number of respondents strongly agreed with the willingness to attend VR liturgies).

Table 6

Descriptive statistics: Acceptability and participation

Question	**Count**	**Mean**	**Standard Deviation**	**Median (50%)**	**Mode**
6. Willingness to attend VR-based Catholic liturgy	171	3.44	1.28	4	5
7. Belief that VR-based liturgy could increase participation	171	3.08	1.37	3	4
8. Willingness to recommend a VR liturgy experience	171	3.40	1.33	4	4
9. VR for worship aligns with Catholic ethical/theological values	171	3.14	1.31	3	2
10. VR worship would make liturgy more engaging for younger generations	171	3.37	1.39	3	5

The first question under acceptability and participation tested the participants' willingness to attend a VR-based Catholic liturgy. With a mean of 3.44, it is evident that respondents are moderately inclined to participate in the VR-based liturgies. The median of 4 indicates that most of the participants are leaning towards agreement with the statement. A standard deviation of 1.28 demonstrates moderate variability, which shows that while many are positive about this idea, there are some who are still pessimistic about the prospects of attending a VR-based Catholic liturgy.

The second question interrogated the belief that VR-based liturgy could increase participation in church-related activities. With a mean of 3.08, the responses are slightly above neutral, an indication that there is a moderate belief that VR integration could increase church participation. A median of 3 points towards neutrality, whereby some participants agree while others disagree. A standard deviation of 1.37 illustrates widespread variability, which reflects varying levels of perspectives concerning the impact of VR on participation.

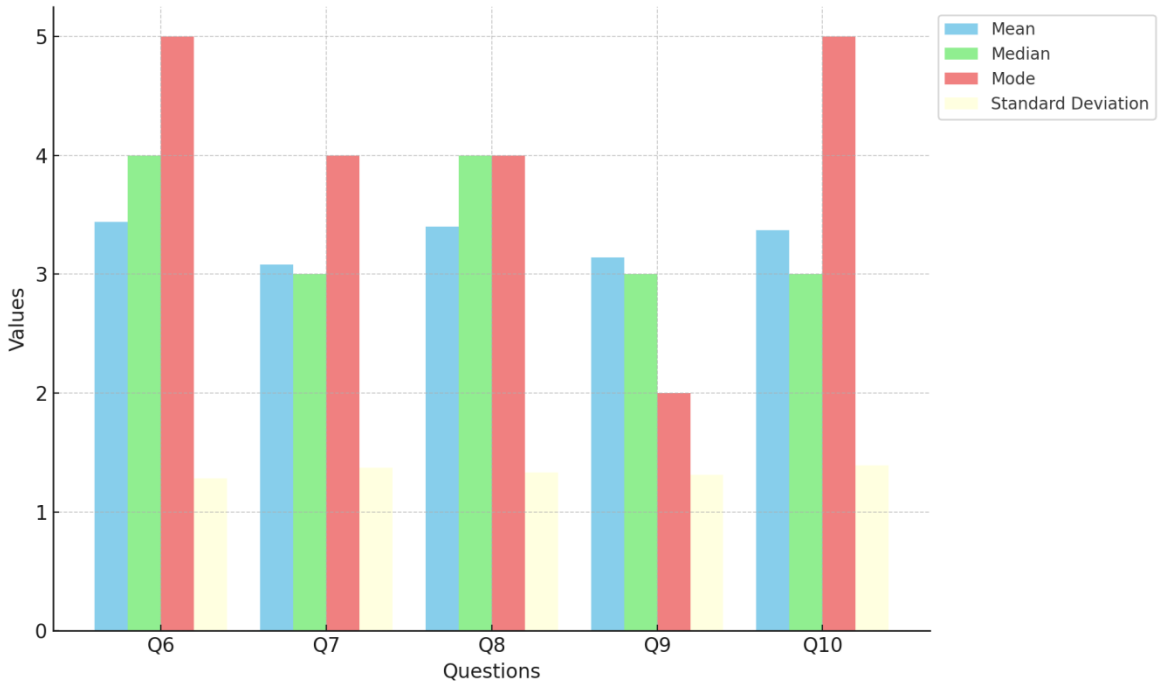
The survey also questioned participants on their willingness to recommend a VR liturgy experience to a colleague or a friend. A mean of 3.40 shows that the responses were moderately leaning towards the idea of recommending VR liturgies. The median of 4 reflects that most respondents are in agreement, supporting the idea of recommending VR liturgies. A standard deviation of 1.33 shows moderate variation, whereby some participants are open to recommending, while others are less enthusiastic about the idea.

The survey also wanted to know whether participants felt that VR for worship aligns with Catholic ethical and theological values. A mean of 3.14 shows that most respondents are either neutral or slightly in agreement with the idea. This is further corroborated by a median of 3, which suggests that most respondents were neutral, with some level of agreement and disagreement. The standard deviation of 1.31 shows variability in opinion among members.

The last question in this category sought to evaluate the respondents' views on whether VR worship would make liturgy more engaging for younger generations. The findings revealed a mean of 3.37, a standard deviation of 1.39, and a median of 3. The mean indicates a moderate belief that VR could make liturgy more engaging to the younger generations. The median suggests that most participants are neutral about the idea, with almost an equal number of agreements and disagreements. The standard deviation of 1.39 shows variability, with opponents and proponents. Figure 4 summarizes the descriptive statistics for this category.

Figure 4

Summary of descriptive statistics: Acceptability and participation



4.1.4 Entrepreneurial and Design Perspectives

Several related questions were asked to test the entrepreneurial feasibility of VR for liturgy and the design elements that will improve adoption. With regard to the mean, the responses to all questions fall between 2.92 and 3.36, indicating that respondents are generally neutral to slightly agree on these entrepreneurial and design-related questions. The standard deviation ranges from 1.20 to 1.34, showing moderate variability in the responses. The median for most questions is 3, meaning that many respondents were neutral in their opinions. Table 7 summarizes this information.

Table 7

Descriptive statistics for entrepreneurial and design perspectives

Question	**Count**	**Mean**	**Standard Deviation**	**Median (50%)**	**Mode**
11. I would consider purchasing or subscribing to a VR platform	171	3.36	1.34	3	5
12. Church leaders and entrepreneurs should	171	3.15	1.28	3	3

collaborate for VR					
13. There are business opportunities for VR in the Church	171	3.34	1.34	3	5
14. Key design elements for VR platforms (colorful avatars, etc.)	171	2.92	1.28	3	2
15. To purchase VR platforms, designers must guarantee privacy	171	3.27	1.20	3	4

As illustrated in Table 7, in question 11, a mean of 3.36 indicates that the respondents showed a moderate interest. It implies that while participants are open to the idea of engaging with VR platforms, they are not overly excited about the prospect. A mode of 5 demonstrates that a significant portion of the participants were inclined to either purchase or subscribe to the platform. A standard deviation of 1.34 signifies variability in the responses given. Figure 5 summarizes these results.

Regarding the question whether church leaders and entrepreneurs should collaborate to create spiritually authentic VR experiences, a mean of 3.15 indicates a moderate level of agreement. While some participants believed that the collaboration was essential, others remained neutral or unconvinced. A mode of 3 corroborates the notion that most of the respondents are in the middle ground, neither strongly supporting nor opposing the collaboration. A standard variation shows some level of variation in the opinions given.

Concerning whether there are business opportunities for VR in the church, most participants responded positively, as illustrated by the mean of 3.34. As such, this is an indication that most of the surveyed participants believe that VR can be integrated within the

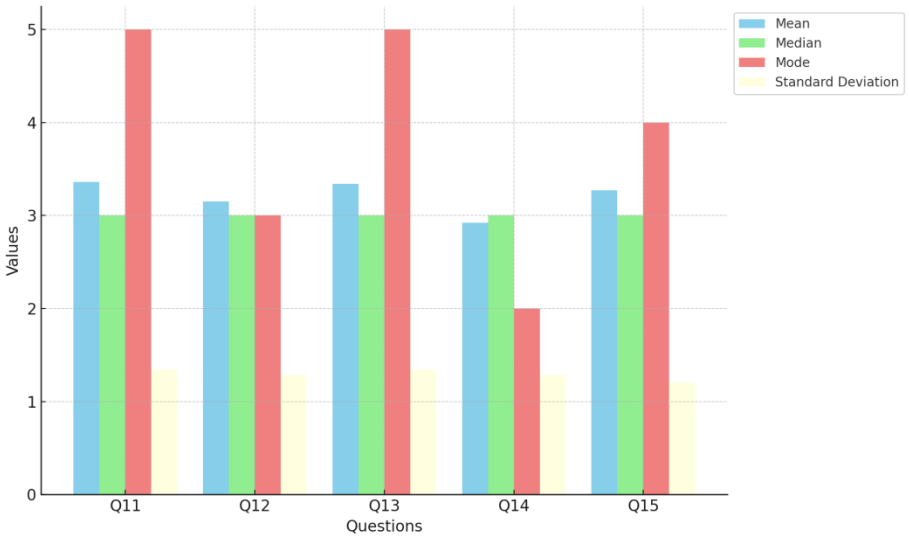
church context. The mode of 5 demonstrates that a significant number of individuals strongly agree with the view that VR has a place in the church. A standard deviation of 1.34 shows that the opinions are varied to a considerable extent. Despite the optimism expressed by these participants, a median of 3 indicates that there is a significant portion of the participants who are unconvinced.

One of the questions investigated the significance of the key design elements for VR platforms, such as colorful avatars. Based on the responses given, these elements are not highly valued by most respondents, as illustrated by the mean of 2.2, which is below the neutral midpoint of 3. This is further confirmed by the mode of 2, which shows that the most common response was a disagreement with the statement. A standard deviation of 1.28 illustrates that respondents provided varied opinions.

The significance of privacy was also tested in the responses. A majority of the respondents agreed that privacy is a crucial factor in purchasing VR platforms, as illustrated by the mean of 3.27. A mode of 4 further illustrates the widespread belief that privacy should be guaranteed before individuals can buy the VR platforms. A standard deviation of 1.20 shows a tighter clustering of the responses, with most of them supporting the significance of privacy.

Figure 5

Summary of descriptive statistics: Entrepreneurial and design perspectives



4.1.5 Market Readiness

The descriptive statistics indicate a moderate level of acceptability and interest in VR-based Catholic liturgy among parishioners, with mean scores for willingness to attend, recommend, and participate ranging from 3.08 to 3.44 on a 5-point scale. The results indicate that while participants may show some signs of openness to VR experiences, concerns

regarding design quality, ethical alignment, and ethics remain. As such, this demonstrates that market readiness may be influenced by the entrepreneurs' willingness to address these factors.

4.2 Overview of the Qualitative Data

The qualitative phase focused on coding and thematic analysis of the interview responses. As previously noted, the interview data were collected from 20 participants, who were prompted using a semi-structured interview consisting of 15 questions. Among the participants were theologians (2), liturgical experts (2), clergy (3), church members (5), lay persons (4), reverend sisters (2), and tech developers and entrepreneurs (2). Informants were all above the age of 25 and were mainly sampled from the Eastern part of Nigeria, ensuring a balance between rural and urban residents. The process adhered to Naeem et al.'s (2023) six-phase framework for thematic analysis. Data was coded, categorized, and organized into key themes that reflected participants' perceptions, concerns, and expectations. The goal was to understand how the sacred, communal, and technological aspects of Catholic worship are perceived in the context of digital transformation.

4.2.1 Coding

Generally, coding entails providing labels to data based on recurring ideas. The initial coding identified 11 unique ideas across participant responses. These codes were further grouped into five axial categories, from which overarching themes were derived. The coding process was conducted manually to ensure close engagement with the data. Table 8 provides a picture of the coding process that was used in the qualitative analysis.

Table 8

Codes and corresponding quotes

Code ID	Description	Sample Quote
C1	Preservation of sacredness and sacramentality	"As a staunch Catholic, I strongly hold that the altar should remain sacred, even in the virtual space" (Lay Person 1). "While it is a good idea, especially for Gen-Zs who love convenience, I need to be convinced that the sacred environment will remain intact" (Lay Person 2).

		"Confession and Communion need presence; VR can't give you that" (Church Member 1).
C2	Communal presence	"The Bible says, where two or three are gathered in God's name, he will be there. I am not sure VR offers Christians an opportunity to commune as God envisions" (Clergy 1). "You can't replicate the warmth of being with other Catholics physically" (Sister 1). "The communal presence and the ability to share the sacrament as was done by Christ during the last supper may be eroded in the VR liturgical space" (Clergy 2).
C3	Theological concerns	"Eucharistic celebration requires our real presence of both the priest and the faithful" (Theologian 1). "The Eucharist must be real... VR can't replicate that" (Clergy 2). "The embodied participation of the Eucharistic celebration, characterized by kneeling, gestures, or even receiving communion, may not be practical in the VR space" (Lay Person 3).

C4	Accessibility and outreach	“I believe older people and other marginalized groups can find VR for liturgy helpful” (Lay Person 4).
C5	Ethical boundaries	“I am more concerned with the safety of my data in this platform” (Lay Person 1).
C6	Spiritual engagement	"VR can help people focus, especially during the homily or devotional practices like the rosary." (Clergy 3)
C7	Technological needs	"It must be affordable, simple to set up, and clear in visuals" (Church Member 2).
C8	Cultural sensitivity	"Some Nigerians might find VR to be too flashy... the Church must guide developers" (Clergy 2).
C9	Business Model	"Partnerships with Catholic universities and seminaries are crucial for VR development" (Entrepreneur 1). “I would fancy a subscription model so that I can opt out at will” (Church Member 3).
C10	Market potential	"VR could work if done well, particularly for retreats and catechesis" (Clergy 1) “I think that is the direction we all need to move. Who knew that COVID would compel us to livestream masses?” (Lay Person 3)
C11	Technology adoption	"The interface needs to be simple, especially for elderly

		parishioners" (Church Member 4) “These prospects could make the church lively, bringing in a new demographic of young and tech-savvy individuals” (Church Member 3). “I fear that elderly parishioners and church members may not support the idea” (Sister 2).

4.3 Thematic Analysis

4.3.1 Authentic Worship

The theme of authentic worship interrogates whether VR preserves the fundamental elements that make physical worship unique. It also explores whether a potential worship in the VR platform preserves the foundational and doctrinal aspects of the Catholic Church. Specifically, many respondents expressed concerns about whether sacredness could be preserved in a virtual environment. Although some believed that VR could be used for spiritual experiences like prayer, retreats, or even repentance, most participants felt that key liturgical elements, especially the Eucharist celebration, require physical presence. Participants said:

“I agree that visuals may seem real and stuff, but you cannot receive Christ in a headset” (Lay Person 4).

"*Confession and Communion need presence; VR can’t give you that*" (Church Member 1).

The voice of the clergy, particularly on the element of sacredness, was essential. In response to the issue of sacredness, a priest said:

"VR can show you images, yes. It can play chants, yes. But that real sacred atmosphere? The one that hits your spirit the moment you walk into the church? VR cannot catch that one" (Clergy 1).

Part of authenticity in worship is cultural relevance. Most people are rigid and want to worship in a manner they feel aligns with their underlying cultural beliefs, values, and perspectives. For instance, interactions with holy water and a crucifix are some of the cultural elements that contribute to authentic worship among Catholics worldwide. One participant expressed his concerns regarding cultural relevance by saying:

"*Some Nigerians might find VR to be too flashy... the Church must guide developers*" (Clergy 2).

A church member said:

"*For me, I cannot miss physical mass because the smell of the incense and a touch of holy water is all I need to start my week. VR cannot guarantee this*" (Church Member 3).

The theme of authenticity predicts acceptability. People are more likely to accept VR technology if it adheres to the tenets of authenticity, which include elements such as sacredness and sacramental alignment. This is essential for determining whether VR entrepreneurship can succeed by adhering to customer demands.

4.3.2 Embodied Community and Presence

The need for embodied community and presence also emerged as a significant theme. Participants felt that virtual reality lacks the sensory and bodily experiences central to Catholic worship. Respondents cited aspects such as genuflection, the smell of incense, and sharing peace with others. One church member put it clearly by saying:

"*For me, the church is not just a matter of words and visuals – it is flesh, breath, and touch*" (Church Member 3).

Similar sentiments were echoed by a reverend sister, who said:

"*You can't replicate the warmth of being with other Catholics physically*" (Sister 1).

The theme relates to acceptability and design elements, which are crucial for VR entrepreneurship that targets the Catholic Church. Designers of the VR must create an interactive dashboard that models an actual sermon to trigger the much-needed demand and acceptability. Failure to guarantee community-like features in the product could lead to poor product performance in the market.

4.3.3 Accessibility

Participants noted that VR was an essential spiritual tool that could enhance access to spiritual activities, especially when physical attendance was difficult. For instance, when one is sick and cannot access the parish physically, they can still participate in Mass. This is particularly essential in bringing marginalized people closer to God. One lay person described this by saying:

"*I believe older people and other marginalized groups can find VR for liturgy helpful*" (Lay Person 4).

This was further supported by a clergy member, a priest, who said:

"If I'm sick or stranded somewhere without a parish, VR could help me stay spiritually connected" (Clergy 2).

From a VR entrepreneurship perspective, accessibility remains a significant competitive element that sets the technology apart from physical worship. Physical worship

has often left out marginalized communities. As such, this theme directly points towards an element of market potential.

4.3.4 Technological Needs

The technological needs of the VR were also discussed. The interview was keen on exploring which technical elements could incentivize stakeholders to adopt this technology. An answer to this question could help innovators come up with a tailor-made VR that aligns with the needs of the congregants. The general sentiment, especially from the church members, was that the VR technology should be user-friendly, especially for the elderly and younger individuals who are less tech-savvy. One church member said:

"The visuals must be clear, and it must be easy to set up, especially for elderly people who may not be comfortable with complex technology" (Church Member 4).

Another member said:

“I hope interactive avatars will be incorporated so that I can feel that I am not alone in a virtual space” (Church Member 3).

The theme aligns with the design aspect, which forms the foundation of the study. It directly addresses elements, such as aesthetics and ease of use, which are foundational when developing a deep tech tool. Accordingly, adhering to these technological needs will increase relevance and demand among the customers.

4.3.5 Business Model and Ethical Concerns

VR’s business potential was explored in the interviews. Issues related to the commercialization of worship strongly came up from some participants. One clergy member expressed concerns associated with creating a profit-driven product by saying:

"Imagine someone charging a monthly subscription for Mass. God forbid!" (Clergy 3).

The sentiments were further supported by a regular church member, who said:

"Turning worship into business is going to be a problem. People might misuse VR if it becomes too commercialized" (Church Member 1).

For the business model to adhere to ethical and theological designs, participants concurred that clergy members should play an active role in the design. More specifically, there should be a collaborative approach that brings together various stakeholders from the religious and business worlds. One lay person described this by saying:

"Theology must guide design, not the other way around. Let priests, bishops, and theologians guide them" (Sister 2).

Discussions regarding the business model test the market potential, especially at a time when the church continues to hold conservative ideas concerning new technologies. Ethical concerns focus on acceptability and design, whereby innovators must balance between profitability and user interests. Moreover, the acceptability and market potential of

this technology depend on whether or not the clergy will be incorporated into the developmental phase.

4.3.6 Market Potential and Platform Success

The interview revealed that there is a solid market potential for VR. Some of the potential areas that this technology can be integrated into include catechesis, retreats, youth formation, and educational purposes. While several participants expressed that VR could appeal to the younger generations, concerns were voiced that it should not be used as a replacement for Mass. One priest said:

"If done well, VR could work for retreats or catechism, but we must be careful not to replace the actual Mass" (Clergy 1).

Platform success can be measured in various ways. The two most fundamental ideas that emerged with regard to evaluating platform success were faith engagement and technological adoption. The goal is to ensure that VR enhances spiritual experience while remaining theologically sound. One church member said:

"Success should be measured by how much VR can help people connect spiritually without distracting them from the real purpose of worship" (Church Member 2).

The theme aligns with the study objectives by evaluating the market potential of VR outside the traditional liturgy. Even if there are hurdles barring the integration of VR into liturgy, the market potential could still lie outside three realms, including catechism, prayer, and youth management. Success measurement offers a framework for continuous development, which enhances perpetual demand from the Catholic congregation.

Table 9

Generated themes

Theme	**Description**	**Key Excerpts**
Authentic worship	The elements of authentic worship include sacredness, sacramentality, and cultural relevance.	"*Confession and Communion need presence; VR can't give you that*" (Church Member 1)
Embodied community and presence	VR lacks the sensory and bodily experiences central to Catholic worship	"*For me, the church is not just a matter of words and visuals – it is flesh, breath, and touch*" (Church Member 3).

Accessibility	VR will enhance access and convenience, especially for the sick and marginalized individuals.	*"If I'm sick or stranded somewhere without a parish, VR could help me stay spiritually connected"* (Clergy 2).
Technological needs	User-friendliness	*"The visuals must be clear, and it must be easy to set up, especially for elderly people who may not be comfortable with complex technology*" (Church Member 4).
Business model and ethical concerns	Adherence to theological elements. Regarding ethics, concerns related to commercialization were raised.	*"Imagine someone charging a monthly subscription for Mass. God forbid!"* (Clergy 3).
Market potential	Potential for VR in catechesis, retreats, and youth formation, but not as a Mass substitute.	"*If done well, VR could work for retreats or catechism*" (Clergy 1).

4.4 Integration of Quantitative and Qualitative Findings (Triangulation)

Triangulating the qualitative and quantitative parts of the study reveals several areas of convergence and divergence. The first area of convergence regards the neutral-to-cautious openness to VR for worship. Acceptability items, such as sacredness in VR and willingness to attend a VR liturgy, are slightly above neutral (mean = 3.05; mean = 3.44, respectively), indicating some level of openness. The interview responses further illustrate guarded openness, especially when respondents mention the need for collaborative design and the huge potential of VR in non-liturgical areas, such as retreats, catechesis, and outreach. Combined, the mixed-method data depict a condition form of acceptance, where individuals will be open to the technology if theological and authenticity concerns are addressed.

Another area of convergence regards the technology and usability concerns. Responses from the survey indicated low to moderate familiarity with VR (mean = 2.42). For their part, the interview emphasized the need for simple, affordable, and easy-to-use technology. The two outcomes point to the same conclusion that adoption depends on design-

related factors, such as user-friendliness and availability of support for the less tech-savvy Catholics.

Both sets of data have also shown similar outcomes with regard to market or business potential. The survey item on entrepreneurial interest (Q11 mean = 3.36; Q13 mean = 3.34) and interview codes regarding partnership and subscription ideas indicate perceived market potential for the VR tools, particularly with regard to non-liturgical applications, such as catechesis, youth engagement, and retreats.

Nonetheless, there was an instance of divergence witnessed in the research. The survey showed that a moderate number of participants were more likely to recommend VR to their counterparts (Q8 mean = 3.40, median = 4, mode = 4), demonstrating a strong market potential. However, some interviews expressed strong theological resistance, as illustrated by the elements of authentic worship such as sacramentality and sacredness. Consequently, this perceived lack of flexibility in accommodating disruptive technologies could eventually impact real-world uptake negatively.

4.5 Summary

The thematic analysis has highlighted the theological, cultural, and practical considerations that must be considered when integrating VR into the Nigerian Catholic Church. While VR holds potential for enhancing certain aspects of liturgy, it cannot replace the physical presence and community that are fundamental to the Catholic faith. Some of the issues raised range from ethical concerns to the commercialization of worship and the lack of authenticity in worship. From a business standpoint, there is a market potential for VR, but not in core liturgical areas like Mass. Rather, the tool can be used for other supportive reasons, including youth management, catechesis, and educational purposes. Moreover, collaboration between tech developers and Church leaders is crucial to ensure that VR tools are theologically sound and culturally appropriate. Table 9 summarizes the main themes drawn from the qualitative analysis.

Reference

Naeem, M., Ozuem, W., Howell, K., & Ranfagni, S. (2023). A step-by-step process of thematic analysis to develop a conceptual model in qualitative research. *International Journal of Qualitative Methods*, *22*. https://doi.org/10.1177/16094069231205789

CHAPTER 5: DISCUSSION

5.1 Technological Acceptance

Part of this research was significantly keen on exploring whether VR for liturgy would be accepted within the Nigerian Catholic context. The technological acceptance would then form the foundation for entrepreneurial feasibility, enabling technology developers and business personnel to explore the opportunity. This section discusses the primary ideas from the mixed-methods study, with a focus on the acceptance of VR for liturgy within the Catholic domain.

5.1.1 The Current State of Digital and Spiritual Engagement in Nigeria

The mixed-methods analysis interrogated the participants' familiarity and engagement with the digital media. On the Likert scale, respondents recorded a mean of 2.42 for familiarity with VR technology. The implication from this outcome is that many participants are aware but not familiar with the technology. From the interview, participants referenced digital or online participation, such as livestreaming. Nonetheless, gaps in access and technological skills were reported. The findings align with the research by Aduloju (2024), which showed that digital technologies are increasingly becoming essential in improving church worship in the Nigerian Catholic context. However, digital and spiritual engagement in the country continues to lag due to various challenges, including low Internet connection, especially in rural areas. Moreover, many Nigerians still value traditional forms of worship, which thrive on face-to-face interactions (Aduloju, 2024).

The survey found that respondents were somewhat comfortable participating via digital platforms (mean ~3.50) and were moderately open to VR-based liturgy (mean ~3.44 willingness to attend). The interviews also revealed that many church members are already participating in digital worship in some capacity, such as livestreaming, online prayer groups, and social media. In the recent past, the Catholic Church in Nigeria has demonstrated liberal attitudes, particularly with regard to technological adoption. With the high number of social media users today, the church is keen on tapping into this demographic. Many churches have opened social media platforms, like Facebook, YouTube, and WhatsApp, which they use for evangelism and livestreaming of masses to reach more people (Dyikuk et al., 2021).

5.1.2 Theological and Cultural Considerations

The findings on theological and cultural considerations offer information regarding value creation and business feasibility. For instance, a major theological issue raised in the research regards the preservation of sacredness in VR-based liturgies. This was particularly emphasized in the interview responses, where participants cited concerns regarding the role of VR in sacraments such as Confession and Holy Communion. The responses emphasize the role of physical embodiment in sacramental participation. This aligns with the findings by

Jun (2020), who argued that the VR space may not represent an authentic expression of Christ's church. In addition, Larson-Miller (2022) asserted that the Catholic faith is sacrament-based and, as such, revolves around the physical presence of the individuals. In such a case, achieving authentic worship in virtual platforms may not suffice, despite the continued call for innovation in the church. From a value creation standpoint, entrepreneurs should design VR platforms in a way that complements rather than replaces the sacredness often associated with liturgy. Any attempts to use VR for sacraments are likely to be viewed as theological and culturally unsound, violating the fundamental tenets of Catholic worship.

Another theological and cultural issue that emerged strongly from the research was the need for communal presence in Catholic worship. The church is viewed as a corporate body of believers, which draws from Mathew 18:20, which stresses that God's presence is often invoked where 2 or 3 are gathered in his name. Other elements of community witnessed during worship include physical interaction (Sign of Peace) and shared prayer. In the interview, respondents raised concerns about VR's capability to replicate the communal feeling associated with physical worship. The Catholic doctrine still reserves conservative values regarding the significance of physical embodiment and communal participation. As illustrated in the Catholic document "Constitution of the Sacred Liturgy: Sacrosanctum Concilium," Catholics' celebration in the liturgical order should not be passive. Rather, faithful must participate with devotion and collaboration (*Sacrosanctum Concilium*, n.d.). From a value creation and design standpoint, VR tools should prioritize interaction and integrate avatars that represent real believers. Such design elements create value and offer an alternative platform for worship that preserves the authentic feel that is often associated with physical devotion.

Critics, however, provide contrary opinions, citing that digital media have redefined the meaning of community through virtual interactions. During the pandemic, social media platforms, such as YouTube, were integral in enhancing the continuity of church services both in the Catholic faith and among the Protestants (Odeleye and Ojo, 2025). Accordingly, these platforms should be viewed as alternative avenues for communal engagement.

Another significant finding from the research is the need for adaptation and localization. Respondents were inclined towards a culturally sensitive platform that aligns with the values, perspectives, and beliefs of the Catholic faithful in the country. Although this was raised as a potential concern, research has shown that VR can indeed be adapted to align with cultural needs. Lin et al. (2024) demonstrated the applicability of VR technologies in cultural communication, including how designers can customize them to adhere to the values and perspectives of the people. In another study by Monteiro et al. (2024), the researchers evaluate various model fits for VR in a bid to find a tailor-made innovation that fulfils the cultural

needs of a particular social group. Such findings demonstrate the much-needed flexibility in the design of VR, making it fit for alignment with Nigerian and Catholic cultural values. From an entrepreneurial standpoint, these findings emphasize ethical design, whereby the cultural elements of the existing communities are taken into consideration. It also provides implications for business feasibility by emphasizing the significance of triggering demand through localization efforts.

The qualitative research has raised issues regarding the potential for ethical violations with the integration of VR in liturgy and other areas within the Catholic doctrine. Participants expressed fears that, besides the security issues, data collected from the platform may be used for malicious reasons. As previously noted, the Catholic document "Catechism of the Catholic Church," Part 3, Article 4, emphasizes the need for moral alignment in the Catholic Church. It stresses that human actions are subjected to evaluation and can either be good or evil (*Catechism of the Catholic Church*, n.d.). Research has shown that VR is associated with privacy concerns, cybersecurity issues, and the potential for manipulation, especially among children (Skulmowski, 2023; Giaretta, 2024). Issues related to privacy concerns are likely to result in trust issues, leading to scepticism and the potential for resistance. From a VR entrepreneurship lens, ethical design must prioritize ethical alignment by guaranteeing security and privacy.

5.1.3 Alternative Roles of VR in the Church

A major theme emerging from the research regards the potential for VR in evangelization and outreach within the Catholic Church. The general perspective among the research respondents is that VR could offer individuals an opportunity for catechesis, youth management, spiritual education, and confession guidance. Research in this area has provided divergent perspectives. Regarding immersive catechesis, researchers like Aukland et al. (2024) and Zammit (2023) have already illustrated the value of VR in religious education. In addition, the study has shown that VR can be used in religious pilgrimages, as established in the interview responses. This aligns with the assertion by Hornbeck and Barrett (2008) that the immersive experience often generated through VR can be useful in religious pilgrimages. However, with regard to confession, research is still conflicted. Dick (2024) demonstrated ways in which virtual technologies are being integrated in providing the sacrament of penance to many Catholic faithful in different parts of the world. Regardless, the Catholic faith does not entirely allow this, despite being aware of the difficulties that may be associated with physical penance. Rome has established that the sacrament of reconciliation should be given in line with the existing universal law and other provisions outlined in *Ordo Paenitentiae* (*Note from the Apostolic Penitentiary on the Sacrament of Reconciliation in the current pandemic*, n.d.).

Accordingly, this strengthens debates on market potential by showing that VR can solve multiple business problems in the church beyond liturgical participation.

5.2 Findings from an Entrepreneurial Lens

More than half of the respondents in the survey indicated that they would consider purchasing or subscribing to the VR platform (Mean~3.36). The qualitative part further corroborates this by showing that there is a considerable market potential for VR, especially for non-liturgical roles. However, the success of the business opportunity is inherently dependent on several factors that have been highlighted in the research findings. Firstly, the target market, which includes the Nigerian Catholics, would only accept a VR tool that has the input of church stakeholders. More than half of the participants (Mean~3.15) indicated that church leaders must collaborate with entrepreneurs in developing a collaborative framework for the VR. The qualitative part of the research called for institutional collaborations in development that bring together Catholic universities and seminaries.

The second condition for acceptance, as illustrated in the research, is the design features. A moderate number of participants in the survey cited design elements, such as colorful avatars (Mean 2.92), while more than half emphasized the need for privacy. Likewise, the qualitative part stressed the significance of data security and privacy. This aligns with the research by Giaretta (2024), which showed that VR is prone to infiltration by third parties and malicious individuals who may steal or misuse personal data. Lastly, VR systems should be user-friendly and interactive to enhance engagement and use across generations.

5.3 Theoretical Integration

This section evaluates the research outcomes from both the qualitative and quantitative parts within the theoretical foundation established for the study. The first theoretical model was Alexander's (2020) entanglement framework, which argued for the interconnectedness between technology and religion, with each aspect influencing the other. Based on the interview responses, respondents are calling for more efficient ways of evangelization, worship, and conducting other religious activities, such as teaching catechism. While there are many practical, ecclesiastical, and ethical issues, it is worth noting that these new demands in religion require technological integration. Another theoretical component is TAM, which investigates the reasons behind the adoption of new technology (Kalayou et al., 2020). Both the interview and survey interpretations have identified several fundamental prerequisites that need to be accomplished before VR for liturgy is accepted. Primary among them are the perceived spiritual meaning of the VR mass, sense of community in collective VR liturgy, and confidence in church-designed VR platforms.

The TAM model proposes that technological acceptance depends on 4 fundamental aspects, including perceived usefulness, ease of use, attitudes, and behavioral intentions

(Kalayou et al., 2020). The findings of the research align with each of these factors. Regarding perceived usefulness, respondents expressed a moderate belief that VR could be useful for liturgy, particularly with regard to increasing accessibility and engagement of the younger generations (M = 3.44). Concerning the ease of use, a high standard deviation of 3.88 demonstrates variability in perceptions of ease of use. It shows that while some respondents are comfortable with the technology, others are more likely to find it easy to use. There are neutral to slightly positive attitudes toward VR adoption, with a mean score of 3.08 to 3.50, which shows that while many respondents are open to the idea of VR integration in the church, there is a considerable degree of ambivalence or uncertainty. Concerning behavioral intentions, moderate willingness to recommend VR liturgies (mean: 3.40) and purchase VR platforms (mean: 3.36) reflects the participants' intentions to engage with and promote VR adoption. In general, the alignment with the TAM model signifies market readiness, which is a positive sign for VR entrepreneurs.

5.4 Entrepreneurial Implications

This research was conducted using an entrepreneurial lens. The theological, practical, and ethical aspects of VR liturgy influence the technological acceptance, which determines whether innovators can target the Nigerian Catholic community with a tailor-made VR model for liturgical services. The overall finding from the research is that despite the conservative nature of the Nigerian Catholic fraternity, VR can be slowly integrated into the church tradition, beginning with non-liturgical elements, such as catechism, liturgical preparation, youth management, and group prayer. For now, integration into the liturgical celebration remains difficult due to the complexity of the sacramental and ecclesiastical traditions of the Catholic faith. Nevertheless, VR is welcomed and will play a critical role in evangelism and bringing the marginalized into oneness with the body of Christ. Based on the research findings, entrepreneurs will need to pay considerable attention to various factors.

Theological factors: Based on the research findings, VR developers for the Nigerian Catholic Church must consider three fundamental factors, including spiritual meaning, sense of community, and the inclusion of church stakeholders in the design of the platforms. In line with the TAM theoretical model, technological acceptance comes after the developer is able to make certain concessions that can appeal to the target market. The VR tools developed for this demographic must retain the communal elements that make physical worship unique. People should be able to connect with one another as they meet for prayers, liturgical preparations, or pilgrimages, among other activities. Secondly, the VR platform must replicate many, if not all, elements that contribute to authenticity and sacredness within the physical environment. Customers want to be assured that avatars or the immersive elements will not erode the sacred feeling often associated with religious environments. Thirdly, and most

significantly, VR developers must ensure that they incorporate church stakeholders, such as bishops and priests, in the design and development of a VR model for the Nigerian Catholic church. This aligns with the research findings that participants want a VR platform that respects Catholic doctrines, traditions, and also the local culture.

Security factors: Security emerged as one of the significant considerations for technological acceptance (mean of 3.27). VR faces multiple shortcomings in the security measures, which could lead to leakage of biometric data, loss of personal data, and third-party theft (Giaretta, 2024). The Catholic faithful in Nigeria will feel more confident that developers have established internal security measures that safeguard the privacy of the users. Efforts may include frequently updating the security patches, multi-factor authentication, and effective anti-malware systems.

Cultural considerations: The research found that most participants would want a tailor-made VR platform that pays close attention to their unique cultural needs. For developers to attract the much-needed demand for the product, they must ensure that the platform supports the local language, including factors such as Nigerian liturgical texts, readings, and responses in line with *The Roman Missal* used in the local language. In addition, relevant iconography and symbolism that align with the Nigerian Catholic faith should be incorporated. Respect for the local culture is also paramount. For instance, the VR technology must not represent sacred objects, such as the altar and the Eucharist, in a manner that is likely to be interpreted as trivial or disrespectful.

Design elements: The design elements must pay considerable attention to community engagement, seasonality, and sensory and emotional immersion. Regarding the community engagement features, the developers should ensure that the technology can show worshippers' avatars (mean of 2.92), fostering the feeling of a living church community. However, as shown by the mean score, this is not a compulsory requirement as participants prioritized other factors. Interactive prayer boards can also be incorporated. For instance, a believer may have the opportunity to light a virtual candle during prayer. The VR should also allow for devotional moments, such as enabling the communal recitation of the rosary or singing a hymn in sync. The second fundamental consideration is the sensory and emotional immersion. Investors in this tailor-made VR platform can incorporate provisions for ambient sound and symbolic light that contribute to the feeling of the sacred, which aligns with spiritual authenticity (mean of 3.05). Lastly, the design elements must adhere to the principles of seasonality. The Catholic Church has an elaborate calendar with events that align with the life of Christ. The liturgical elements tend to change from one season to another. For instance, the prayers, recitations, and even regalia used during Lent are different from those that will be used during the Christmas period. Thus, the design features should account for different

seasons, including Christmas nativity scenes, Easter palms (*Verbų sekmadienis*), and candle-lit All Saints vigils.

5.5 Pastoral Considerations

The research has paid considerable attention to the role of the clergy in the potential implementation of the new technology (Mean of 3.15 and standard deviation of 1.28). Generally, the quantitative findings showed that more than average supported a collaborative framework in designing the VR tool, with moderate differences in opinions. The measures that the Catholic hierarchy will take will be of significant importance in the entrepreneurial success of the new technology. By defining how and when to use the technology, product developers can estimate the demand for the product. In the implementation phase, the Catholic hierarchy will have several roles, including:

Partnering with the developers: Stakeholders from the Catholic Church will directly influence the product development, ensuring that it aligns with the prerequisites identified in the sections above. They will work collaboratively with the innovators to guarantee local adaptation and cultural considerations. From an entrepreneurial perspective, this is crucial as it determines the quality of the product developed, including its associated features.

Defining the scope of use: The Catholic hierarchy will play an active role in determining the scope of use of the technology. Based on theological interpretations of the Bible and advice from the Roman Catholic Church, the clergy will define the scope of the product's use, ensuring that it has minimal interference with the sacred aspects of the Catholic sacraments. This is crucial from an entrepreneurial perspective as it will determine the demand for the product, based on how frequently or infrequently it will be used. In addition, this information will determine whether the innovators develop the products in demand or en masse.

Training facilitation: As identified in the research, VR requires training for effective use. This is particularly essential for members of the older generation who may not be tech-savvy. Proper training is crucial for their effective use and to avoid the digital gap that may arise due to age-related limitations. The clergy will be central in organizing seminars for lay persons who will learn about the VR and its applicability in the church. Consequently, the lay people will train the rest of the church members on how to effectively use the innovation. From an entrepreneurial perspective, training is essential as it forms the basis for user satisfaction and feedback.

Making procurement decisions: The church hierarchy will also be central in making procurement decisions regarding the supply of the products. They will assess the scope and advise the congregants and their respective Christian communities on the quantity of products to procure within a specific period. In this regard, the product developers will work directly with

the church committee on a business platform to ensure mutual benefit. The church hierarchy may also request certain concessions, such as discounts, which are crucial in establishing a long-term business relationship. Nevertheless, it is essential to note that the Catholic Church adheres to strict ethical standards, necessitating increased transparency and accountability.

5.6 Limitations of the Study

One of the limitations of the study was the lack of geographical diversity. Participants in both the interview and the survey were sampled from Eastern Nigeria. Although the parishes were randomly selected, the generalizability of the study is affected when respondents are primarily drawn from one part of the country.

The research outcomes are also context-specific in nature. From the onset, the research was only concerned with the Nigerian Catholic population, excluding any other demographic. From an entrepreneurial standpoint, the findings could only guide investment in Nigeria and not anywhere else due to the limited generalizability of the study findings.

Purposive sampling and snowballing were considered the most efficient ways of identifying participants for this study due to their efficiency and ability to identify the desired subjects for the study. Nevertheless, as non-probabilistic methods, they risked introducing biases in participant selection. There was also the possibility of sampling bias as participants could be skewed by region, parish size, and exposure to technology. Furthermore, the sampling procedure did not make any concerted efforts to ensure the proportional representation of the participants (clergy, seminarians, lay faithful, and theologians). The lack of group balance among the participants means that there is a high likelihood that the outcomes could be tilted.

The participants used in both the interview and the survey were not of the same age. As long as someone was 18 years and above, they were eligible to participate in the study. However, this is problematic, considering that age is a fundamental variable in technological acceptance. Even without including religious perspectives, younger people are more likely to be receptive to modern technologies compared to their older counterparts. For this reason, age should have been considered as a fundamental variable, necessitating its control during sampling.

During the interview, it was observed that some participants demonstrated a sense of sacredness sensitivity. For instance, due to strong religious convictions, these participants did not want to provide responses that could potentially be viewed as too radical in relation to the existing ecclesiastical order. While this reservation was welcome and even anticipated, as illustrated in the informed consent, it potentially affected the quality of outcomes in the interviewing stage.

5.7 Future Research Directions

Based on the study's limitations, future research directions can include several changes to make the study more generalizable, accurate, and meaningful to the stakeholders. Firstly, prospective studies must consider group balance at the participant level to ensure that all voices are equally represented in the study. This is helpful in ensuring that the outcomes are not tilted in a single direction. Secondly, this study was cross-sectional in nature, whereby attitudes were assessed within a specific period. Future studies may consider longitudinal research, which tracks changes in perception over time, especially as the VR liturgy becomes more familiar among the church stakeholders.

Thirdly, this study was conducted from an entrepreneurial perspective, focusing on the likelihood of technological acceptance of VR liturgy within the Nigerian Catholic fraternity. The acceptability and applicability of this innovation open the door for entrepreneurs to design culture-sensitive VR technologies that fit the needs of the Catholic Church. Future studies should take a step forward by conducting cost–benefit analyses and exploring funding or entrepreneurial models that could make VR sustainable for parishes. Also, long-term maintenance and training needs could be explored. Lastly, future studies should be hypothesis-based, inferring age, geographical location, and gender on technological acceptance. This is particularly helpful in marketing, given that entrepreneurs develop a better understanding of the demographics or regions with the most significant market potential.

5.8 Chapter Summary

This chapter discusses the findings from a scholarly perspective, incorporating theoretical models related to the study. Although VR liturgy threatens the established ecclesiastical order and perspectives regarding the sacred, the mixed-method study shows its applicability in other secondary church processes, such as prayer, meetings, and liturgical preparations. Based on the TAM model, the section has analyzed the factors that make VR acceptable or unacceptable within the liturgical space. Limitations such as sampling and generalizability issues have been identified. These weaknesses form the foundation for future studies.

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CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 Summary of the Findings

In summary, this research was premised on 3 fundamental objectives. Firstly, it sought to assess the demand and acceptability of VR tools within the Nigerian Catholic Church. The findings indicate moderate demand and acceptability as gauged from the above-average mean of the respondents. However, the qualitative study showed that the acceptability of the technology depended on its ability to replicate the tenets of authentic worship that are only found during physical devotion. Secondly, this study aimed at identifying the market potential of the VR tools among Nigerian Catholic adherents. The quantitative research showed a moderate score in willingness to purchase or subscribe to the VR platform, and the notion that there exists a business opportunity for VR in the church. Research from the qualitative data supported this by showing that, besides VR for liturgy, which is likely to result in many hurdles, a market exists outside Mass to include catechesis, prayer, meetings, worship, and youth development. The third objective was to identify the design feature that will enhance the acceptability, demand, and competitiveness of the VR tools. Responses from the survey supported the need to implement VR platforms, such as colorful avatars, and the need to guarantee privacy. This was supported by the qualitative part, which emphasized the need for ethical design and a collaborative framework that will provide the clergy with more power in influencing features that increase sacredness and sacramentality on the platforms.

6.2 Business Recommendations

6.2.1 Entrepreneurial Recommendations

The first business-related recommendation regards the value proposition. For a product to sell, there is a need for marketers to offer customers unique selling points that make their product superior to that of the competitors. The moderate mean score of 3.44 for the willingness to attend a VR-based liturgy suggests that while not everyone is fully convinced, there is a significant portion of respondents open to this idea. Based on the responses from the qualitative study, VR promises to offer a flexible and accessible way of worshipping, which makes it an alternative to traditional physical worship. Therefore, in this way, VR offers significant value to the marginalized and individuals who are disenfranchised from the church for various reasons, such as distance or disability.

The second element is user segmentation. User segmentation entails the ability to divide a large market into small, distinct units. The largest group (46.3%) falls within the 25-34 age range, which correlates with higher tech-savviness and a greater inclination towards VR technology. Furthermore, urban respondents, who represent 80.7% of the sample, are more likely to be familiar with VR and have supporting infrastructure such as electricity and

internet connection. Accordingly, this means that VR will see more adaptation in urban areas compared to rural ones.

The third aspect regards the business model implications. The moderate willingness (mean of 3.36) to purchase or subscribe demonstrates that these are the two most popular payment options. Concerning the aesthetics and customization elements, the research showed that avatars are a lower priority (mean of 2.92). This suggests that businesses may not need to focus much on advanced features, but rather on aspects like cost, simplicity, and accessibility in designing the VR platforms. More importantly, trust and privacy (mean of 3.27) should be prioritized when designing the VR platforms.

6.2.2 Business model canvas

The Business Model Canvas (BMC) has become an integral aspect of modern business practice. Bachmann et al. (2025) asserted that it offers a structured model for conceptualizing, assessing, and innovating business models. The aspects within the BMC include key partners, key activities, value proposition, customer relationships, customer segments, key resources, channels, cost structure, and revenue streams (Bachmann et al., 2025). Table 10 represents the BMC for the VR product targeting the Catholic Church in Nigeria.

Table 10

BMC

Element	**Description**
Key Partners	- Catholic dioceses and parishes - VR hardware providers - Liturgical and catechism content creators - Catholic schools and seminaries - Catholic media organizations
Key Activities	- Develop VR liturgies and catechism modules - License VR tools to churches and schools - Host virtual prayer meetings, rosary recitations, retreats - Platform maintenance, updates, and technical support - Community management and customer training
Key Resources	- VR platform and proprietary software - Theological content library (approved by church authorities) - Technical development team - Partnership network with Catholic institutions - Brand reputation and trust with religious communities

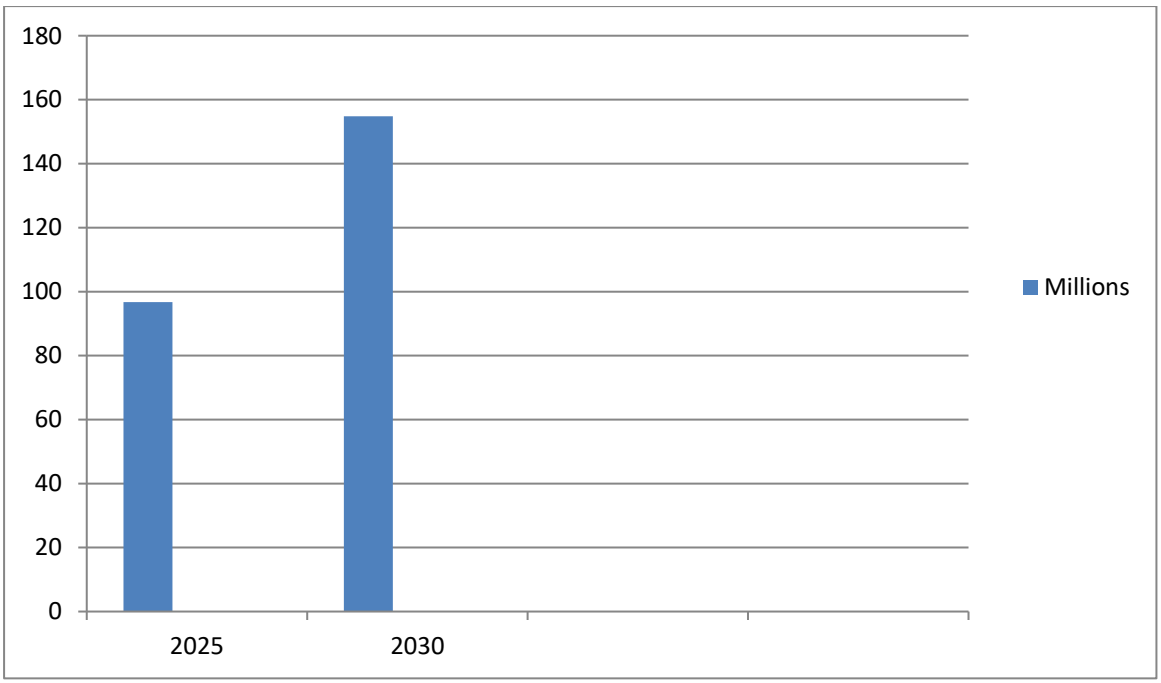
Value Proposition	- Immersive worship experiences for homebound Catholics - Enhanced catechism training for youth and adults - Virtual community engagement across parishes and dioceses - Cost-effective outreach and evangelization tool - Support for continuity of faith practices in remote settings
Customer Relations	- Tiered subscription packages (individual, parish, diocesan) - Donor-driven funding and sponsorship programs - Dedicated parish/diocese account managers - Interactive youth engagement programs - Customer support and training resources
Channels	- Direct licensing to parishes and dioceses - Online subscription portal - Partnership with Catholic schools and seminaries - Catholic education networks - Catholic conferences and events
Customer Segments	- Parishes and dioceses - Homebound or remote individuals - Catholic schools and catechism classes - Young Catholics seeking engaging tools - Catholic philanthropists and donors
Cost Structure	- Platform development and maintenance - Content creation (liturgical, catechism, training modules) - Hardware licensing and distribution - Marketing and parish outreach - Customer support and account management
Revenue Streams	- Subscriptions (individual and institutional) - Donations and sponsorships - Licensing fees for parishes/dioceses - Educational package sales to Catholic schools - Premium fees for virtual retreats and seminars

6.3 Market Trends in VR

Information on market trends is essential for investors entering a specific market segment. Research has shown that the AR and VR market is currently at $96.7 million in 2025 (Statista, 2025). Revenue is expected to grow at a rate of 9.86%, leading to a size of $154.8m by the end of 2030 (Statista, 2025). Currently, VR is mostly used in the advertising sector. Projections indicate that the number of VR users is expected to reach 67.4 million by 2030 (Statista, 2025). User penetration numbers are expected to increase between 2025 and 2030 from 16.7% to 25.7% (Statista, 2025). Some of the factors that have contributed to the growth of VR in the country include the strong desire for immersive educational tools and the need for innovative entertainment experiences (Statista, 2025). Currently, there is no information on market trends of VR within the religious sector. Figure 6 shows the revenue projections from VR in the next 5 years.

Figure 6

VR revenue projections in Nigeria



6.4 SWOT Analysis

The SWOT analysis is an essential business tool that evaluates the strengths, weaknesses, opportunities, and threats of the proposed business venture. Based on the research findings from the mixed-methods study, VR may not be immediately integrated into the main liturgical service due to doctrinal and sacramental issues within the Nigerian Catholic Church. Nonetheless, the research showed that technology can still be tailored to secondary roles within the church, including prayer, meditation, catechism, and even pilgrimages. In this regard, conducting a SWOT analysis will help investors to understand the likelihood that this technology will yield a return on investment.

6.4.1 Strengths

As illustrated by the market trend data, the VR market, including the spiritual and devotional segment, is expected to grow globally, regionally, and in Nigeria. As such, this shows that VR products will attract high demand in the future. Moreover, this trend analysis data demonstrates that there is a growth in the number of tech-savvy demographics who are willing to revolutionize their ways of life by integrating this technology into everyday practices such as worship and entertainment. Innovators and entrepreneurs have the opportunity to collaborate with church ministers, parishioners, and other members of the Catholic hierarchy to ensure that the VR product is tailored to the needs of the church, guaranteeing culture-sensitive use. One of the major concerns raised, especially in the interviews, was the possibility of developing a generic VR model that was out of touch with the cultural realities of the Nigerian Catholic landscape. However, through such partnerships, innovators can come up with tailored products that trigger demand from consumers.

Entrepreneurs can also be sure of a ready customer base in the Nigerian market. Once the technology gets approval from the Catholic hierarchy, investors can expect larger supplies due to the sheer number of Catholic faithful in the region. The highest demand is expected to come from the younger tech-savvy faithful who are likely to desire a more animated way of engaging in church activities. Another strength regards the revenue potential. The moderate willingness (mean of 3.36) to purchase or subscribe to VR platforms suggests there is a market potential for businesses that offer affordable and accessible VR-based worship services. Investors can expect multiple streams of investments, ranging from the initial purchase to the different subscription models that can enable users to access different services. Investors may also decide to license the product to parishes, which is another viable source of revenue.

6.4.2 Weaknesses

Resistance among older and conservative congregants can limit the market potential of the VR tool. The quantitative section has raised critical issues, including concerns regarding privacy, sacramentality, and sacredness. As such, conservatives are more likely to resist the technology. A narrow market could hamper demand, adversely affecting the potential for return on investment. Furthermore, VR is still controversial within the Catholic setting. As illustrated in the research, issues of doctrine, sacramentality, and ecclesiastical order emerged. As such, traditionalists may still feel the need to embrace the conventional way of worship and conducting church business. Therefore, the skepticism, coupled with the potential resistance from the older generation of congregants, could reduce the market size of the product.

Congregants are also likely to experience technological complexities, which is a challenge envisioned under the TAM theoretical model. The high standard deviation (3.88) for

comfort with digital platforms suggests that VR technology may be too complex for some users, particularly the elderly. Privacy and security challenges have also been highlighted in the study (mean of 3.27).

6.4.3 Opportunities

The VR technology will have a stronger acceptance among youths aged 18 to 34, as illustrated by responses regarding familiarity, digital comfort, and willingness to recommend. With VR being a potential tool for evangelization and engagement, entrepreneurs will have solid market prospects when targeting the youth. A crucial opportunity to consider is the fact that VR will enhance church accessibility to persons with disabilities, remote populations, and the homebound due to age-related issues. The research, particularly the qualitative part, backs this opportunity by showing that VR can increase participation among those who are unable to physically avail themselves. From a business standpoint, this equates to a new market opportunity.

6.4.4 Threats

Theological resistance is a major threat associated with the business idea. Issues, such as sacredness preservation, need for communal experience, and physical presence, emerged consistently in the qualitative study. Resistance from the church authority could hamper the formal adoption of the technology. The potential for digital divide is likely to be high, disproportionately affecting older and rural groups who were underrepresented in this study. Moderate privacy concerns reflect the threat of privacy infiltration and cybersecurity issues that could lower trust in the technology.

6.5 Chapter Summary

This chapter has taken a more entrepreneurial look at the research findings. From an investor perspective, the research findings show a positive outlook for VR entrepreneurs targeting the Nigerian Catholic community. Aspects such as the market size, demographic dynamics, and external factors favor a successful business venture. Nonetheless, business personnel must pay considerable attention to the weaknesses and threats identified, developing contingency measures. For instance, with the possibility of new competitors in the market, investors should try to differentiate themselves using innovation, price, and efficiency, leading to unique products that align with the market needs.

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Annexes

Appendix A: Interview Questions

1. What does the concept of sacredness mean to you, and do you believe it can be preserved in a virtual liturgical environment?
2. How would you describe your experience or familiarity with virtual reality (VR), especially in spiritual or communal contexts?
3. What elements of the Catholic liturgy (e.g., Eucharist, homily, communal prayer) do you think could be meaningfully experienced through VR?
4. In your opinion, what aspects of liturgical participation might be lost or diminished in a VR setting?
5. How important is physical presence during the liturgy, and can VR replicate the sense of community and reverence it provides?
6. What would encourage or discourage you from participating in a VR-based Catholic liturgy?
7. What ethical or theological concerns, if any, do you associate with using VR for religious worship?
8. What design factors or elements would you consider when purchasing a VR for a liturgy product?
9. In what ways do you think entrepreneurs or tech developers should collaborate with Catholic Church leaders to develop meaningful VR technologies for potential integration into church activities?
10. What business opportunities or partnerships could help the Church adopt VR tools effectively?

Appendix B: Survey Questions

This survey is part of a research study exploring the potential for integrating virtual reality (VR) tools into Catholic liturgical practice in Nigeria, conducted through an entrepreneurial lens. Your responses will remain anonymous and will only be used for academic purposes. Please respond honestly based on your experiences and beliefs. For each statement, choose the answer that best reflects your opinion.

Section A: Familiarity and Spiritual Perceptions

1. How familiar are you with Virtual Reality (VR) technology?

☐ 1 – Not familiar ☐ 2 – Slightly familiar ☐ 3 – Somewhat familiar ☐ 4 – Familiar ☐ 5 – Very familiar

2. I believe the sacredness of liturgy can be preserved in a virtual environment.

☐ 1 – Strongly disagree ☐ 2 – Disagree ☐ 3 – Neutral ☐ 4 – Agree ☐ 5 – Strongly agree

3. I feel comfortable participating in spiritual or communal activities using digital platforms.

☐ 1 – Strongly disagree ☐ 2 – Disagree ☐ 3 – Neutral ☐ 4 – Agree ☐ 5 – Strongly agree

4. Physical presence during the liturgy is essential for a meaningful worship experience.

☐ 1 – Strongly disagree ☐ 2 – Disagree ☐ 3 – Neutral ☐ 4 – Agree ☐ 5 – Strongly agree

5. I believe VR can replicate the sense of community and reverence found in physical liturgy.

☐ 1 – Strongly disagree ☐ 2 – Disagree ☐ 3 – Neutral ☐ 4 – Agree ☐ 5 – Strongly agree

Section B: Acceptability and Participation

6. I would be willing to attend a VR-based Catholic liturgy if available.

☐ 1 – Strongly disagree ☐ 2 – Disagree ☐ 3 – Neutral ☐ 4 – Agree ☐ 5 – Strongly agree

7. I believe VR-based liturgy could increase religious participation among people unable to attend Mass physically.

☐ 1 – Strongly disagree ☐ 2 – Disagree ☐ 3 – Neutral ☐ 4 – Agree ☐ 5 – Strongly agree

8. I would recommend a VR liturgy experience to others.

☐ 1 – Strongly disagree ☐ 2 – Disagree ☐ 3 – Neutral ☐ 4 – Agree ☐ 5 – Strongly agree

9. The idea of using VR for worship aligns with Catholic ethical and theological values.

☐ 1 – Strongly disagree ☐ 2 – Disagree ☐ 3 – Neutral ☐ 4 – Agree ☐ 5 – Strongly agree

10. I believe VR worship would make the liturgy more engaging and relatable for younger generations.

☐ 1 – Strongly disagree ☐ 2 – Disagree ☐ 3 – Neutral ☐ 4 – Agree ☐ 5 – Strongly agree

Section C: Entrepreneurial and Design Perspectives

11. I would consider purchasing or subscribing to a VR platform designed for Catholic liturgy.

☐ 1 – Strongly disagree ☐ 2 – Disagree ☐ 3 – Neutral ☐ 4 – Agree ☐ 5 – Strongly agree

12. Church leaders and entrepreneurs should collaborate to create spiritually authentic VR experiences.

☐ 1 – Strongly disagree ☐ 2 – Disagree ☐ 3 – Neutral ☐ 4 – Agree ☐ 5 – Strongly agree

13. There are business opportunities (e.g., partnerships, app development, VR tools) that can help the Church adopt VR effectively.

☐ 1 – Strongly disagree ☐ 2 – Disagree ☐ 3 – Neutral ☐ 4 – Agree ☐ 5 – Strongly agree

14. The key design elements to include are colourful avatars, realistic visuals, and user-friendliness.

☐ 1 – Strongly disagree ☐ 2 – Disagree ☐ 3 – Neutral ☐ 4 – Agree ☐ 5 – Strongly agree

15. To purchase the VR platforms, designers must guarantee strong privacy and confidentiality.

☐ 1 – Strongly disagree ☐ 2 – Disagree ☐ 3 – Neutral ☐ 4 – Agree ☐ 5 – Strongly agree

Appendix C: Informed Consent

Study Title: Exploring the Integration of Virtual Reality into Catholic Liturgical Practice in Nigeria: An Entrepreneurial Perspective

Principal Investigator: [Your Name]
Affiliation: [Your Institution / Department]
Contact Information: [Your Email Address]

Purpose of the Study

You are invited to participate in a research study that aims to explore how Virtual Reality (VR) can be integrated into Catholic liturgical life in Nigeria. This study focuses on spiritual, cultural, and technological perspectives, with special attention to how VR might impact sacredness, community participation, and church engagement.

Procedures

If you agree to participate:

- You will either complete a **survey** (approximately 10–15 minutes) or participate in an **interview** (approximately 30–45 minutes).
- The **survey** includes 15 multiple-choice questions using a 5-point Likert scale.
- The **interview** consists of 15 open-ended questions about your views and experiences related to VR and Catholic liturgy.
- Interviews may be audio recorded with your permission for transcription purposes only.

Voluntary Participation

Your participation in this study is completely voluntary. You may choose not to participate or to withdraw at any time without any penalty or loss of benefits.

Confidentiality

All responses will remain **confidential and anonymous**.

- No personally identifiable information will be collected or published.
- Data will be stored securely and used only for academic purposes.
- Audio recordings (if applicable) will be deleted after transcription and verification.

Risks and Benefits

- **Risks:** This study involves minimal risk. Some questions may involve personal beliefs or experiences, which you may choose not to answer.
- **Benefits:** While there is no direct benefit to you, your insights may contribute to the Church's understanding of how digital tools like VR can support evangelization, liturgical participation, and spiritual growth.

Compensation

There is no monetary compensation for participating in this study.

Questions or Concerns

If you have questions about the study or your rights as a participant, please contact the chief researcher at [your email].

Consent Statement

By checking the box or signing below, you acknowledge that:

- You have read and understood the information above.
- You voluntarily agree to participate in this study.
- You are at least 18 years old.
- (If applicable) You consent to having your interview audio recorded.

☐ I agree to participate in this research study.

☐ I agree to be audio recorded (interview participants only).

Name of Participant (print): _____

Signature: _____

Date: _____