Willingness to adopt Metaverse in Rotterdam, Netherlands

A study to unveil the acceptance drivers of Metaverse in Retail and Hospitality industries.

Bachelor Thesis

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July 03, 2023

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Executive Summary

The implementation of Metaverse technology across various industries, particularly in retail and hospitality, has been extensively researched and recognized for its significant value. However, limited attention has been given to understanding businesses' perspectives and their readiness to adopt the Metaverse, especially in the context of Rotterdam, Netherlands. This paper aims to address this gap by investigating and identifying the factors that drive Metaverse adoption, utilizing the technology acceptance model with an incremental adaptation focused on businesses as adopters.

The research question of this paper is "How do acceptance drivers influence interest in the Metaverse, and what is the impact of technology risk as a moderating factor?" This question can be further divided into two sub-questions: 1) What are the effects, size, and direction of the acceptance drivers on interest in the Metaverse? 2) How does the presence of the moderator (technology risk) affect this relationship?

To answer the research question, an online survey will be conducted to collect data from business owners and high-level managers. It is important to note that respondents should possess ownership or have a significant role in shaping the direction of their respective businesses. The survey will assess the three identified acceptance drivers: perception of usefulness, perception of ease of usage, and investment considerations. Additionally, the research will examine technology risk as a mediating factor. Hypotheses will be formulated to assess the effect size and direction of the acceptance drivers and technology risk on interest in Metaverse adoption.

The research findings indicate that the identified acceptance drivers have a significant and positive effect on interest in the Metaverse. Furthermore, the paper identifies a significant and positive mediating effect of technology risk on the relationship between ease of usage perception and interest in the Metaverse.

This paper provides a systematic framework for businesses that are new to the concept of the Metaverse to approach the technology. The online survey also serves as a self-assessment tool for business owners and high-level managers to determine their readiness for adopting the Metaverse. The survey comprehensively evaluates various aspects of adopting the novel technology, including benefits, operations, expenditures, and implicit risks.

Future research on this topic is recommended to address several areas of improvement. Firstly, a larger sample size is suggested, as this study targeted a relatively small and hard-to-reach audience, resulting in a sample size of only 22 respondents. Future studies should aim for a sample size of 150-200 respondents to enhance the accuracy and validity of the findings. Additionally, pretesting the survey is advised to improve the reliability of variable measurement. Moreover, further research is needed to gain a holistic understanding of the acceptance drivers of the Metaverse.

Keywords: Technology acceptance, Metaverse, Retail, Hospitality

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Acknowledgment

Dear reader,

I would like to express my gratitude to my supervisor Dr. Bojan Georgievski for his kind guidance and continuous encouragement. The writing process has been enjoyable under his supervision. I gained both personal growth and academic development as I progress with my thesis writing journey.

I would also like to extend my appreciation towards my second reader for his/her dedicated time and effort in reviewing my paper.

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Chapter 1: Introduction

1.1 Research context

The concept of the Metaverse is increasingly gaining popularity and recognition as it becomes more mainstream, with numerous real-life business applications emerging. Consequently, the academic literature on the topic is rapidly expanding, reflecting the growing attention towards this groundbreaking technological advancement.

Regarded as the next internet interface, Metaverse aims to bridge the gap between the physical and virtual worlds by simulating multisensory experiences. According to Meta, a leading innovator in the field, the Metaverse is defined as a cohesive and immersive ecosystem in which the boundaries between the virtual and physical realms are indistinguishable to users. In this environment, individuals can utilize avatars and holograms to engage, collaborate, and socialize through simulated shared experiences (Newton.C, 2021).

The concept of the Metaverse is continuously evolving and being shaped through ongoing research and development, as the market potential for this technology becomes increasingly lucrative. McKinsey, a reputable consulting firm, estimates that the Metaverse will generate a total value of $5 billion. (McKinzey & Company, 2022) It is only natural that companies would want to seize a share of this market. As a result, an increasing number of Metaverse platform builders and providers are entering the market. Notable examples include Second Life, which emerged in the early 2000s, as well as more recent platforms like Sandbox and Roblox. The versatility of the Metaverse has been widely praised, with applications found in various industries. However, the rise of these new Metaverse providers is particularly prevalent in the retail and hospitality sectors. Projects such as Nikeland, Hyundai, and Disney have captured public attention in these industries.

The relationship between Metaverse and industries such as retail and hospitality lies in their shared focus on customer experience. Hospitality has always been centered around providing customers with exceptional service and competing to offer the best experiences in relation to the value of money spent. A prevailing theme within the hospitality industry is the shift towards customer co-creation, involving customers in the design of products and services that best serve their needs and desires. This entails collecting customer input to assess current offerings and performance and adapting and improving to meet evolving consumer and customer behaviors.

Similarly, the retail industry is transitioning from merely facilitating consumption to providing curated experiences. In the past, retailers competed by meeting customer needs through superior solutions. However, this approach is shifting towards holistic customer experiences that involve beyond the

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products themselves but also factors such as lead time and after-purchase care, etc. which ultimately reinforce the overall customer experience.

The Metaverse has the potential to fulfil, enhance, and even reshape both industries including but not limited to

1.1.1 New customer touchpoint

A customer touchpoint is any point of contact between the customer and a brand throughout the purchasing journey.

In the context of retail industry, the black swan COVID-19 curtailed physical shopping, leaving online platforms as the sole option. Consequently, the pandemic has helped propelling the growth of e-commerce. This unprecedented shift in consumer behavior has transformed the landscape of shopping experiences. Nevertheless, the predominant online shopping experience has largely been confined to static 2D websites, where product presentations are limited to photos and videos. The absence of physical interaction, including the possibility of product trial through touch and feel without upfront payment, has resulted in customers reluctance to make purchases. Consequently, products that require a higher level of involvement necessitate additional time for reviewing and assessing their suitability to individual needs. (Jain. M, 2019)

The Metaverse offers a potential solution to address these challenges by enabling product trials by utilizing augmented reality (AR). By overlaying digital content on top of our digital reflection, AR allows active engagement with a product or visualizing a product's look and function in the real-world setting. Examples include make-up try on or new furniture decorating and placement. Our digital reflection is often referred to by academic papers as avatar. Metaverse allows for personalized experiences through the customization of avatars that facilitate curation of a brand experience. This has specific relevance for the clothing industry. By eliminating the need for physical samples or prototypes, the Metaverse reduces costs and logistical challenges while offering a convenient and accessible way for consumers to evaluate products.

Similarly, the concept of the Metaverse can be applied within the hospitality industry, enabling customers to view hotel rooms or providing a glimpse into travel destinations before making the final booking. Another paper connects the hospitality industry with the Metaverse, highlighting the potential of using 3D design to facilitate "try before buy" experiences, providing customers with a realistic preview of hotel facilities and tourist attractions. This immersive approach encourages customers to make more informed decisions, mitigating doubts and uncertainties associated with prepaid services that cannot be returned. The adoption of the Metaverse as a marketing tool is mutually beneficial for

businesses and customers alike, as it enhances the customer's ability to test new products and services before making a commitment.

In conclusion, Metaverse serves as a new touch point for customers to explore and experience new products and services before making purchasing decisions. By addressing the limitations of traditional online shopping experiences and offering immersive and interactive features, the Metaverse emerges as a promising channel for enhancing customer satisfaction and facilitating informed decision-making.

1.1.2   Immersive experience

The Metaverse presents an emerging approach to creating immersive experiences in the retail and hospitality industries. It serves as a means of connecting with customers through a 3D space that replicates or even surpasses the brick-and-mortar experience. By generating an endless digital space, the Metaverse enables a more creative and interactive shopping experience for consumers.

Utilizing virtual reality (VR) and augmented reality (AR) as facilitators, the Metaverse blurs the lines between physical objects and virtual content. This transformative experience holds significant potential for both the retail and hospitality sectors. In the context of physical experiences, various stimuli such as touch, texture, and odor contribute to our shopping experiences, influencing factors such as satisfaction, pleasure, excitement, and even discomfort or aversion. These cues have a direct impact on consumers' assessments, purchasing decisions, revisiting intentions, and recommendations.

However, the online space currently lacks the technology capability to simulate and translate these physical senses into the virtual shopping experience. Nevertheless, research conducted by Hassounneh and Brengman suggests that similar mechanisms and concepts can be applied to virtual commerce or virtual retail. They used bubbles as an interpretation of cues for indirect environmental awareness.

The Metaverse emerges as a solution to bridge the gap between e-commerce and physical shopping by offering a more immersive experience. Accessing this environment can be achieved through wearable accessories such as VR headsets, AR glasses, or mobile apps. The Metaverse paints a vivid environment through stimulating visual and audio sensory, promote psychological and mental connection with the virtual world.

In the case of the hospitality industry, Kampampuly et al. assert that the hospitality experience encompasses both tangible and intangible factors. Tangible aspects include the comfort of a real bed or the taste of an actual meal, which are yet to be fully replicated in virtual experiences. However, the Metaverse can already replicate and enhance intangible factors such as the scenery, the atmosphere, and the general experiences.

In another paper, Gursoy et al. (2022) note that the Metaverse is still in its early stages, and while the technology can support early customer journeys, it cannot yet fully substitute the range of sensory experiences such as smell, taste, and texture. Despite these limitations, the Metaverse has the potential to disrupt the industry by enhancing intangible aspects like ambience and mood setting. For example, users can experience a luxurious stay with a 360-degree sky view or enjoy smoothening music and warm, dim lighting at a restaurant, all from the comfort of their own space. The aesthetic setup can be recreated to immerse customers in visually appealing environments, while auditory cues and to some extent, simulated personal interactions can enhance the overall experience within the Metaverse.

1.2 Research problem

Amidst the ongoing speculative assessments surrounding the Metaverse, a prevailing consensus among numerous papers is the recognition of its vast potential for application. Within the extensive library of Metaverse literature, a considerable portion is dedicated to research agendas, reflecting the crucial role of academic researchers in offering guidance and insights on how to navigate this emergent technological landscape. The formulation of research agendas by scholars serves as a valuable tool for directing businesses towards optimal resource allocation and strategic decision-making in relation to the Metaverse. These research agendas provide a structured framework and guidelines that facilitate a systematic approach to understanding and harnessing the transformative capabilities of the Metaverse.

These research agendas encompass various topics, including future guidance on leveraging metaverse as dynamic advertisement (Buhalis 2023), interactions in the metaverse and brand communication (Kim 2021), multisensory-cue and customer experience (Barrera 2023), metaverse on customer attitudes and behaviour (Gursoy 2022). Notably, Yoo (2023) presented an astonishing 27 directions for future research, emphasizing the complex interactivity between stakeholders (customers, retailers, and brands) throughout the various stages of the customer journey.

Papers often focus their lens on value creation for the consumer and highlight areas where businesses can capitalize in this transformative journey. Additionally, the literatures also address the challenges posed by technological risks. Endorsing and incorporating a technology in its premature stage carries inherent risks, including data privacy, protection, safety, and government regulation. These concerns also arise during the booming of the internet and e-commerce. The Metaverse is no exception. Therefore, government bodies play a crucial role in legislating and standardizing regulations that protect the majority of non-technical users while not impeding the pace of innovation. Early Metaverse adopters can face the risk of regulations impacting their upfront investment and the additional expense in align with new legal requirements.

1.3   Research questions

Given the potential benefits and drawbacks of the Metaverse, it is important to assess how ready businesses are to implement and integrate this technology into their customer journey. However, there is a lack of academic papers examining the perspective of business owners and whether they are convinced to adopt the Metaverse. The research scope will specifically focus on the case within the Netherlands, specifically the Rotterdam city which is deemed to be among the most innovative European city (rotterdampartner, 2022). This research paper will address the research question: "How do acceptance drivers influence interest in Metaverse, and what is the impact of technology risk as a moderating factor?" which can be broken down into the sub-questions of:

- What are the effects size and direction of the acceptance driver on the interest in the Metaverse?
- How does this effect deviate with the presence of the moderator?

1.4 Academic relevance

By leveraging and adapting the technology acceptance model to derive a theoretical framework that maps the process of adopting the Metaverse. This paper aims to fill the literature gap by identifying what are the attributes driving the Metaverse acceptance and quantify their extent of contributing towards the decision of adopting. The paper will use the innate technology risk as the mediator. Ultimately, the paper will consolidate a survey list that serve as a guideline for businesses (within the retail and hospitality sectors specifically in the Rotterdam, Netherlands) to use as a reference in their decision-making process.

1.5 Managerial relevance

This paper presents a systematic framework to assist businesses that are new to the concept of the Metaverse in approaching the technology. The primary objective of the research is to answer the research question by conducting a survey. This survey will also serve as a guideline for a self-assessment tool for business owners and high-level managers to evaluate their readiness for adopting the Metaverse. The findings of this paper can be used by businesses as a benchmark to assess their own level of interest in Metaverse technology.

1.6 Structure of the paper

The model will address the drivers of adoption and outline methods for measurement and assessment in parts two and three. Subsequently, the results will be presented, delving into the statistical findings and their implications in answering the objectives of the paper. Any shortcomings will also be discussed, providing insights for further research in the future.

Chapter 2: Theoretical framework
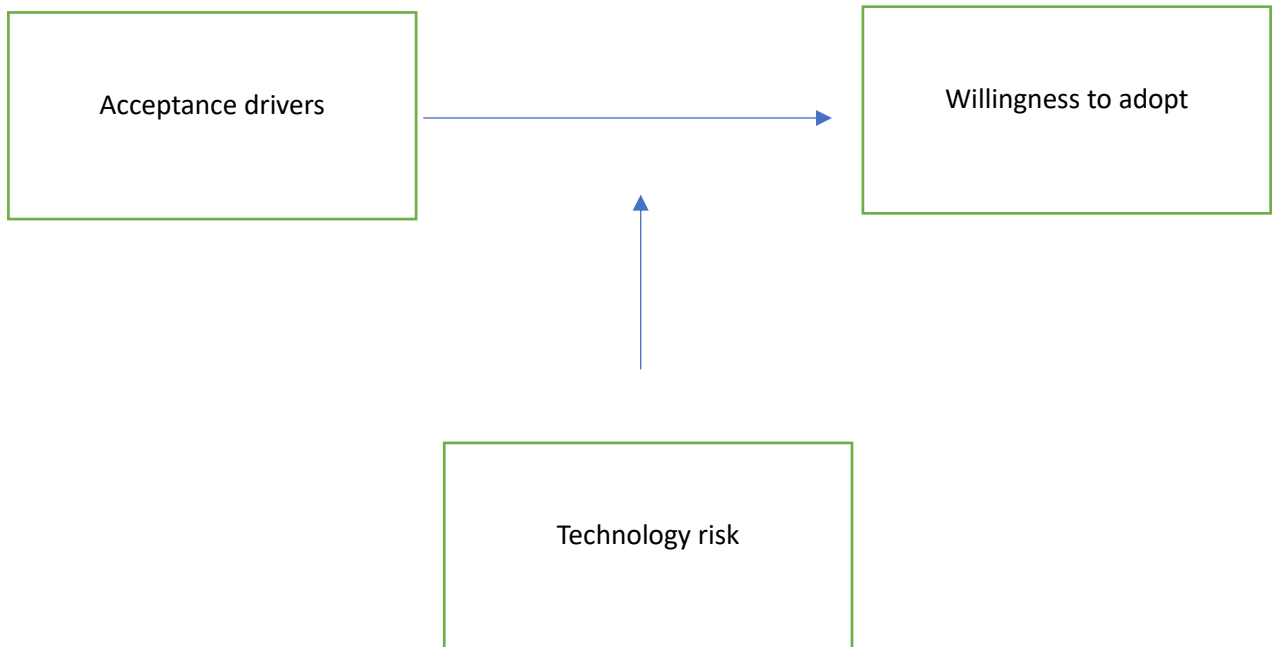
2.1 Technology acceptance model

The value generated by technological advancements for individuals and organizations is widely acknowledged, as it enables efficient work processes and cost reduction. This recognition was first addressed during the introduction of personal computers in the 1980s, which prompted researchers to delve into the topic of technology acceptance. This line of inquiry seeks to understand the factors that can promote a mass adoption of innovative technologies.

In 1989, Davis developed the Technology Acceptance Model (TAM) as a framework for uncovering the psychological and behavioral processes underlying the acceptance of new technologies. The model explores the relationship between technology features and actual usage, shedding light on the decision-making drivers of users when adopting a technology system. TAM serves as a foundational framework for comprehending the end user's perspective.

The TAM model has demonstrated impactful rationalization on past empirical studies on technology usage and offers practical implications for technology design. Its growing attention has led to subsequent research efforts aimed at refining its predictive capabilities and expanding the range of

explanatory variables. However, at its core, TAM can be distilled into two key factors: ease of use and usefulness. Perceptions of these factors directly influence the predicted outcome of technology acceptance.

2.2 Acceptance drivers

To align the model with the business from the adopter's perspective, it is imperative to acknowledge that businesses are entities driven by the pursuit of profitability. Even in the context of non-profit organizations, achieving positive financial performance is vital for their survival and continued operations. Therefore, when considering investments such as adoption of a new technology, it is only natural for businesses to conduct a return cost-benefit assessment to determine the viability of their investment. They need to evaluate whether the investment will yield sufficient returns to break even and generate profits. Thus, this study aims to explore the acceptance drivers of ease of use, usefulness, and profitability.

Ease of use refers to the degree of simplicity and effectiveness in understanding and executing a technology to achieve desirable outcomes. Meanwhile, the degree of usefulness represents the extent to which the adoption of a technology leads to improved performance. End users are more likely to embrace a new technology if it satisfies the criteria of enhancing their current work processes, making them more efficient and productive. Additionally, the technology must be user-friendly, ensuring accessibility and usability for a wide range of users.

Profitability encompasses two key factors: costs (related to setup, operation, and maintenance) and expected revenue generation. An investment in technology should be evaluated not only in terms of the initial costs but also the potential long-term financial benefits it can bring. By considering these factors, businesses can make informed decisions about technology adoption, weighing the expected profitability against the associated costs.

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2.3 Willingness to adopt

In essence, the willingness to adopt a technology is closely linked to the actual usage of that technology. The behavioral intention to use a technology is a key determinant of the subsequent behavioral outcomes. Behavioral intention refers to an individual's conscious plan to execute a specific action (Davis, 1992), although measuring this construct can be challenging. However, a follow-up study in 1993 suggested that intention can be effectively substituted with attitude towards the behavior itself. More specifically, the attitude represents an emotional evaluation of the anticipated outcomes associated with taking a particular action. According to Ajzen (2011), higher evaluations of the behavior are indicative of a greater likelihood of the action being performed.

Considering these insights, the interests of business owners and managers can be evaluated to gauge their openness towards the adoption of the metaverse. This evaluation can serve as a proxy for respondents' intentions to implement the metaverse in their organizations. By examining their attitudes and interests, we can gain insights into their readiness to embrace this innovative technology and the likelihood of its successful implementation.

2.4 Technological risk

The emergence of the Metaverse presents a unique set of challenges, particularly in the domains of data security and data privacy. The novel nature of this technology, with its complex and immersive multisensory experiences, amplifies the potential negative consequences that can result from security breaches and privacy infringements. As highlighted by Alspach (2022), the innovative and intricate nature of the Metaverse poses significant challenges in terms of monitoring, identifying potential threats, and implementing proactive measures to safeguard data compared to existing immersive environment platforms. The dynamic and evolving nature of the Metaverse requires proactive and robust approaches to ensure data security and privacy protection, which may demand innovative solutions and strategies that go beyond conventional practices.

2.4.1 Privacy

Data privacy concerns arise from the extensive collection of data within the context of the Metaverse. To enable an immersive experience and seamless interaction with avatars, a comprehensive user identification process is necessary. This involves capturing and utilizing various types of data, including facial expressions, hand and eye coordination, vocal vibrations, and other biometric identifiers. While

the primary goal of collecting this data is to enhance the authenticity and realism of the digital experience, the sheer volume of personal data associated with user recognition becomes an enticing target for hackers seeking to exploit and manipulate it. The sensitive nature of this data raises significant concerns regarding privacy breaches and unauthorized access, emphasizing the need for robust security measures and stringent data protection protocols within the Metaverse environment. Efforts should be made to strike a balance between providing an immersive and personalized experience while ensuring the confidentiality and security of user information.

2.4.2 Data security

Data security plays a crucial role in safeguarding personal information against malicious practices and unauthorized access. It encompasses various measures aimed at protecting digital information throughout its lifecycle, including physical security of hardware systems and robust authentication and authorization processes for software applications. Failing to implement adequate data security measures can have significant negative impacts, such as:

Identity theft: Inadequate data security can lead to the theft of personal data, resulting in the exposure of sensitive information like names, social security numbers, financial details, and credentials. This can have severe consequences, ranging from financial losses incurred by hackers gaining unauthorized access to an individual's financial accounts, to emotional distress experienced by the victim. The leakage of private information can lead to long-term repercussions for individuals and undermine their sense of privacy and security.

Impersonation attacks: Attackers may attempt to assume the identity of a trusted entity in order to bypass security measures and gain privileged access to confidential data. This form of attack can further exacerbate the situation by tampering with systems and exploiting vulnerabilities, potentially causing significant damage. Not only does this compromise the reputation and trust of the individual whose identity has been impersonated, but it also undermines the overall trustworthiness and reliability of the technology itself.

Given the potential devastating outcomes, it becomes evident that ensuring robust data security is of paramount importance.

2.4.3 Government legislation

Government bodies play a vital role in formulating guidelines to ensure a safe and secure immersive experience in the digital space. Their involvement is necessary to protect users from third-party

malpractice and to address criminal offenses, such as verbal abuse, stalking, and harassment. By establishing clear boundaries and enforcing regulations, governments can create a legal framework that discourages harmful behavior, promotes responsible digital engagement, and provides a safer environment for users.

2.5 Hypothesis

The main objective of this paper is to examine the influence of acceptance drivers on the willingness to adopt the Metaverse. Specifically, it aims to determine the direction and degree of influence of each driver and explore the role of the mediating variable, technology risk, in the relationship between the variables. Based on the technology acceptance model discussed earlier, it is hypothesized that ease of use positively correlates with the willingness to adopt the Metaverse. Privacy and security concerns, on the other hand, may negatively impact the perceived user-friendliness and ease of use of the technology. These risks introduce additional complexity and barriers to usage, as users may be more reluctant or cautious when it comes to information sharing and overall engagement with the technology. Additionally, it can be argued that this aligns with the concept of computer anxiety, which has been found to have a significant correlation with perceived ease of use, as noted by Venkatesh and Bala (2008).

H1: Ease of usage has positive effect on willingness to adopt the Metaverse.

H2: Technology risk has negative influence between ease of usage and the willingness to adopt Metaverse.

Perceived usefulness, like ease of use, has positive correlation with technology adoption, as highlighted in various research papers on the technology acceptance model. Consequently, the hypothesis argues for perceived utility is positively associated with the willingness to adopt the Metaverse. However, it is important to consider the potential negative influence of technology risk on the correlation between perceived usefulness and adoption willingness. The presence of risks and the need for additional caution when engaging with technology can introduce hurdles and diminish the perceived usefulness if the resulting inconveniences outweigh the expected benefits.

H3: usefulness has positive effect on willingness to adopt the Metaverse.

H4: Technology risk has a negative influence between usefulness and the willingness to adopt Metaverse.

Bulhalis (2020) explores how technology can empower businesses in the tourism industry to operate efficiently, increase profitability, and gain a competitive edge. The executive director of technology innovation at Estee Lauder advocates for the metaverse, suggesting that it will provide a competitive advantage in the future. This leads to the generalization that investing in the metaverse can generate positive returns, prompting businesses to secure a share of the lucrative market and enhance their competitiveness within their industry. Risk and reward have long been central topics in finance and investment. When taking on a certain level of risk, individuals typically expect a corresponding reward. However, the level of risk appetite varies based on the personal risk tolerance of managers and the risk assessment conducted by the firm and its owners. Therefore, a risky investment in a novel technology like the metaverse is expected to reward high returns. Nevertheless, it should be noted that risk appetite cannot be generalized for all businesses in Rotterdam, Netherlands. Consequently, a hypothesis is formulated to assess the risk tolerance and preparedness of businesses in navigating such risks.

H5: return on investment has positive effect on willingness to adopt the Metaverse.

H6: Technology risk has a negative influence between expected return on investment and the willingness to adopt Metaverse.

Chapter 3: Methodology

This section will provide an overview of the research methodology. It will cover the sampling procedure, how the variables (dependent, independent, and mediating) will be measured, and the statistical tests selected to address the research question.

3.1 Empirical setting

This study aims to investigate the relationship and the direction of the effect between acceptance drivers and willingness to adopt, with the moderating influence of risk tendency. To achieve this objective, a quantitative research approach will be employed as the most suitable method.

To ensure the precision of quantitative findings, a sufficiently large sample size is necessary. A larger sample size leads to a lower margin of error and improves external validity by closely representing the true population. Conducting surveys is an appropriate means of gathering a sizable sample. Online surveys are considered advantageous due to their ability to reach a larger audience, resulting in increased volume efficiency. Additionally, they are economically efficient as they require fewer human resources and less time investment, as explained by Niel (2017). However, it is important to acknowledge potential challenges associated with online surveys, such as low response rates and high dropout rates, which may hinder the attainment of a desirable sample size. Furthermore, online surveys lack control, posing challenges to internal validity.

3.2 Design

The online survey for this research was designed using Qualtrics software and comprised of three parts.

The first part focused on measuring the acceptance drivers, namely ease of usage, usefulness, and profitability. To assess ease of usage, respondents were presented with three questions related to their perception of the ease of using, operating, and maintaining the Metaverse. Following this, three questions gauged the perceived usefulness of the technology in terms of enhancing online experiences, attracting customers, and improving overall competitiveness. Lastly, respondents were asked about their investment intentions in terms of Metaverse experts, physical infrastructure, and their expectations of return on investment. All questions in this section were answered on a Likert scale ranging from 1 to 5.

The second part of the survey addressed technology risk, which served as the mediating factor. Respondents' risk appetite was evaluated through three questions regarding concerns over data security,

data privacy, and regulatory issues. Participants were asked to rate their level of concern regarding these risks on a Likert scale of 1 to 5.

The third part aimed to assess the respondents' willingness to adopt the technology. A single question was used, asking participants to indicate their level of interest in applying the technology to their business on a scale of 1 to 5.

In addition to measuring variables, the survey also aimed to determine the extent of Metaverse usage. This was assessed through a multiple-choice question asking respondents whether they were already using the Metaverse or had intentions to do so in the near future. Furthermore, the size of the respondents' companies was considered to highlight the diversity within the sample.

To ensure clarity and comprehension, the survey was designed using simple and commonly understood language. Such Jargons terminology were translated into simpler terms to facilitate understanding for non-technical respondents.

The phrasing of questions aimed for consistency in approach and response. A scale of 1 to 5 was used consistently, where 1 indicated low interest or a negative perception, while 5 indicated high interest or a highly positive opinion. In cases where questions were reverse-coded, such that a response of 5 indicated a negative perception and 1 implied a positive perception, the questions will be inverted.

By employing multiple items to measure each construct, such as using three statements for each acceptance driver, the survey aimed to enhance internal validity and evaluate the consistency of variable measurement. The statements used in the questionnaire were based on the definitions discussed in the research papers throughout the introduction and theoretical framework.

3.3 Measurement of variable

The Likert scale is a widely used measurement tool for assessing beliefs, opinions, and attitudes. By employing a continuous scale, respondents can express their degree of agreement or disagreement with a statement or imagined scenario. In the context of this paper, the Likert scale is suitable for measuring the perception and attitudes of respondents towards the adoption of the Metaverse.

Furthermore, the Likert scale is appropriate when constructs consist of multiple items that aim to measure various facets of a topic. This aligns with the structure of the survey, where each acceptance driver is divided into three sub-statements to capture different aspects of the topic.

Typically, Likert scales are presented with five or seven response options (Earden, Netmeyer & Mobley, 1993). Numerous research papers support the use of a five-point scale, emphasizing its sufficiency in

providing response options while ensuring readability (Marton-Williams, 1986). Other studies have found that a five-point scale is less confusing and leads to higher response rates such as Peravantis, J. (2009)

3.4 Procedure

The survey is intended for firms operating within the retail and hospitality industry in Rotterdam, Netherlands, without differentiation based on factors such as company size or location. The target audience specifically consists of owners or upper-level managers, preferably those who hold positions on the board of directors. It is assumed that these managers represent the business and possess the authority to propose a vision and actively shape the growth of the company. Consequently, the willingness of the business to adopt the Metaverse is considered equivalent to the willingness of these owners/managers to implement it. The identity of the managers participating in the survey remains confidential, and no traceable information is collected.

To reach the targeted owners/managers, communication is conducted through public contact information such as email and telephone numbers, which typically reach administrators or receptionists. They are kindly requested to forward the research context and the online survey link to the intended recipients.

The desired response rate for the survey is approximately 150-200 participants. This sample size aims to adhere to the principle of the law of large numbers, whereby statistical inference based on a larger sample is closer to the true population mean.

To incentivize respondents to engage and complete the survey, the option to access the final research report is made available to those expressing interest.

3.5 Data Analysis

To ensure the consistency and reliability of the test items measuring each acceptance driver, a prior test will be conducted. Crombach's alpha will be employed to assess each test item score against the total score of the corresponding driver. A higher total alpha indicates greater measurement reliability for the acceptance driver.

Given that the paper's objective is to examine the effect of each acceptance driver on willingness to adopt, separate regression models will be developed for each acceptance driver. In total, three regression equations will be constructed. Furthermore, the interactive effect between the explanatory variable

(acceptance driver) and the outcome variable (willingness to adopt) will be considered in each regression.

The regression model will be structured as follows:

$$Y = B_0 + B_1 acceptance\ driver + B_2 acceptance\ driver * innate\ risk + \varepsilon.$$

Where:

Y is the independent variable of willingness to adopt.

B1driver is the score of one of the three acceptance drivers.

B2driver* risk is the interaction between the acceptance driver and the technology risk.

Chapter 4: Analysis and Result

4.1 The sample

The survey conducted online yielded a total of 26 responses, with 4 of them being incomplete and is therefore excluded from the analysis. This resulted in a valid sample size of 22 responses for data analysis.

A comprehensive overview of the data sample is presented to provide insights into the diversity of businesses included in the research and to gain a deeper understanding of the readiness of the Rotterdam, Netherlands market towards the Metaverse. Among the respondents, two out of every five respondents were in the hospitality industry, while the remaining respondents belonged to the retail sector.

The survey findings revealed that nearly three-quarters of the participating businesses expressed no intention to adopt the Metaverse. The remaining portion of the respondents was evenly split between those who showed interest in implementing the Metaverse in the near future and those who had already incorporated the Metaverse into their business operations.

Further analysis of the data indicated that approximately half of the responses came from family-owned businesses, while one-third represented international brands. The remaining portion of the responses comprised local business chains. These findings highlight the diverse nature of the sample and provide valuable insights into the current landscape of businesses in relation to the Metaverse adoption in Rotterdam, Netherlands.

4.2 Cronbach's Alpha

To assess the internal consistency and reliability of the multiple item construct measurement, the research will employ the Cronbach's Alpha test. The interpretation of the Cronbach's Alpha results will be based on Field's (2013) guidelines, which categorize reliability as excellent for test scores above 0.9, high for scores ranging from 0.7 to 0.9, moderate for scores between 0.5 and 0.7, and unreliable for scores below 0.5. The table provided below presents the test scores of the measured variables.

Table 1: Cronbach's alpha scores for the measured variables and the corresponding items

Construct	Items	Cronbach's alpha	Cronbach's alpha if item deleted
Ease of use	E1	.846	.785
	E2		.862
	E3		.696
Usefulness	U1	.567	.310
	U2		.452
	U3		.336
Investment	I1	.729	.783
	I2		.322
	I3		.769
Risk	R1	.747	.581
	R2		.752
	R3		.647

The majority of the measurement variables exhibit high reliability, indicating their consistency in measuring the intended constructs. The measurement for Ease of Use demonstrates the highest reliability score of .846, followed by .747 for the Risk measurement and .729 for the Investment measurement. Although the Usefulness measurement has a slightly lower reliability score, it is still within an acceptable range. The Cronbach's Alpha scores suggest that removing any of the items would not significantly increase the reliability of the corresponding measurement. Therefore, all items and their respective measurements will be included in the linear regression test.

4.3 Descriptive statistics

The measurement score for each variable is calculated by taking the average of the sum of item scores divided by the number of items. The table below presents an overview of the variables and their corresponding measurement scores.

Table 2: Score of the measurement variables

Company	Ease of use	Usefulness	Investment	Risk	Interest in Metaverse
1	4.00	3.33	2.00	4.00	2
2	3.33	3.33	2.67	3.33	3
3	4.00	1.33	3.00	2.33	4
4	3.00	2.33	2.00	2.67	2
5	4.00	3.00	3.33	3.67	3
6	3.33	2.67	2.33	4.67	2
7	2.67	2.67	2.00	3.33	2
8	4.00	1.67	4.67	2.33	4
9	3.33	3.00	1.00	4.00	2
10	4.33	4.00	4.00	5.00	3
11	3.33	4.00	3.00	3.00	3
12	3.00	2.33	2.33	4.67	2
13	3.00	2.33	2.33	4.33	1
14	3.67	2.33	2.67	5.00	1
15	4.67	3.00	3.00	3.67	2
16	3.67	4.33	4.33	3.67	4
17	4.67	5.00	4.33	4.67	5
18	3.67	3.67	3.00	2.00	5
19	2.33	2.67	1.67	3.00	2
20	4.00	2.67	2.33	4.00	3
21	3.67	3.00	2.33	3.67	3
22	4.33	4.00	4.67	4.33	5

4.4 Linear Regression

Prior to conducting the linear regression analysis, the explanatory variables were centered. Centering involves subtracting the meaning of each variable from its respective values. This process is necessary when the variables do not have a meaningful value of zero, as it allows for a more meaningful interpretation of the regression coefficients. Additionally, centering interactive variables helps to mitigate the issue of multicollinearity, which occurs when there is a high correlation between predictor variables. By centering the interactive variables, the regression analysis can better capture and interpret the individual effects of each variable on the outcome variable.

Table 3: regression of usefulness and the moderating variable on the interest in Metaverse

Interest in Metaverse	Coefficient	Standard Error	t	Sig
Usefulness	1.037	.341	3.038	.007*
Moderating	.461	.494	.934	.362
Constant	2.813	.224	12.540	<.001
Number of obs.		R-squared		
22		.350		

Significant level *p<0.05, **p<0.01

The coefficient Usefulness variable is 1.037. an increase of 1 unit of Usefulness perception translates to an increase of 1.037 unit of score of interest in the Metaverse. This effect is significant as the P-value of .007is lower than the threshold of 0.05. The coefficient of the moderating effect of technology risk is .461. This indicates a unit increase in the moderating effect leading to a positive interaction between the Technology risk perception and usefulness on the interest in the Metaverse. The effect is however not significant as the P-value of .362 is higher than the significant threshold.

Table 4: regression of ease of usage and the moderating variable on the interest in Metaverse

Interest in Metaverse	Coefficient	Standard Error	t	Sig
Ease of usage	.699	.234	2.986	.008*
Moderating	.646	.227	2.850	.010*
Constant	2.724	.206	13.224	<.001
Number of obs.		R-squared		
22		.453		

Significant level *p<0.05, **p<0.01

The coefficient Ease of usage variable is .699. An increase of 1 unit of Ease of usage perception translates to an increase of .699 unit of score of interest in the Metaverse. This effect is significant as the P-value of .008 is lower than the threshold of 0.05. The coefficient of the moderating effect is .646. This indicates a unit increase in the moderating effect leading to a positive interaction between the

Technology risk perception and Ease of usage on the interest in the Metaverse. The effect is also significant as the P-value of .01 is lower than the significant threshold.

Table 5: regression of investment and the moderating variable on the interest in Metaverse

Interest in Metaverse	Coefficient	Standard Error	t	Sig
Investment	.860	.191	2.986	<.001**
Moderating	.131	.231	2.850	.577
Constant	2.857	.186	15.335	<.001
Number of obs.		R-squared		
22		.453		

Significant level *p<0.05, **p<0.01

The coefficient Ease of usage variable is .860. An increase of 1 unit of Investment translates to an increase of .860 unit of score of interest in the Metaverse. This effect is significant as the P-value of .001 is lower than the threshold of 0.05. The coefficient of the moderating effect is .131. This indicates a unit increase in the moderating effect leading to a positive interaction between the Technology risk perception and Investment on the interest in the Metaverse. The effect is, however, not significant as the P-value of .577 is higher than the significant threshold.

Table 6: Finding summary table.

H(n)	Hypothesis	Conclusion
H1	*Ease of usage has positive effect on willingness to adopt the Metaverse*	Accept (Significant)
H2	*Technology risk has negative influence between ease of usage and the willingness to adopt Metaverse.*	Accept (Significant)
H3	*usefulness has positive effect on willingness to adopt the Metaverse*	Accept (Significant)

H4	*Technology risk has negative influence between usefulness and the willingness to adopt Metaverse*	Reject (Insignificant)
H5	*Return on investment has positive effect on willingness to adopt the Metaverse*	Accept (Significant)
H6	*Technology risk has negative influence between expected return on investment and the willingness to adopt Metaverse*	Reject (Insignificant)

Chapter 5: Conclusion and limitation

5.1 Discussion

The extensive discussions in various research papers have highlighted the substantial benefits for adopting metaverse technology in the retail and hospitality industry. These papers shed light on the various applications that businesses can capitalize on. However, limited attention has been given to understanding businesses' perceptions of this novel technology and their readiness to implement it.

This paper aims to investigate and identify the factors that drive metaverse adoption from the perspective of businesses and corporates as end-users of the technology. Drawing upon the technology acceptance model, the study focuses on three acceptance drivers: perception of usefulness, perception of ease of usage, and investment considerations. Additionally, the research examines technology risk as a mediating factor. Hypotheses are formulated to assess the effect size and direction of the explanatory variables (acceptance drivers) and the mediator (technology risk) on the outcome variable (interest in metaverse adoption).

To test these hypotheses, an online survey was conducted using a multi-item construct, resulting in a dataset consisting of 22 observations from various businesses. Employing linear regression analysis, the statistical findings indicate that all the acceptance drivers have a significant and positive impact on the interest in metaverse adoption. Furthermore, when considering the mediator effect, the interactive variable of ease of usage with technology risk demonstrates a significant and positive influence on the outcome variable.

5.2 Managerial implication

This paper provides a systematic framework for businesses new to the concept of the Metaverse to approach the technology. It focuses on three key drivers of Metaverse adoption: ease of usage, usefulness, and investment. To quantitatively assess the influence of each acceptance driver, a multi-item construct survey was conducted. The survey serves as a self-assessment tool for business owners and high-level managers to determine their readiness for adopting the Metaverse. It comprehensively evaluates various aspects of adopting the novel technology, including benefits, operations, expenditures, and implicit risks.

The results of the statistical tests reveal that the identified acceptance drivers have a significant and positive impact on readiness for implementing the Metaverse. Specifically, usefulness, investment, and ease of usage ranked in order of their influence on the interest in Metaverse, with scores of 1.037, 0.86, and 0.699, respectively. This suggests that businesses prioritize investment considerations (expenditure and return) when contemplating technology implementation. By comparing their own perceptions of the acceptance of drivers against the benchmark of the sample population, businesses can gauge their relative importance.

Notably, this research incorporates technology risk as a moderating variable in assessing the influence of acceptance drivers on interest in the Metaverse. The statistical findings indicate that technology risk is a relevant factor that interacts with ease of usage, yielding a positive and significant moderating effect. Therefore, business owners and managers should be aware of the defined technology risks associated with the Metaverse when evaluating their own perceptions of ease of usage.

5.3 Limitation and future recommendations

Prior to publishing the survey to the target audience, it is crucial to conduct a pretest on a smaller group. This allows for the collection of feedback from the test audience, enabling the researcher to refine the survey questions by rephrasing, adding, or removing items. By improving the clarity of the questions and reducing self-interpretation, the variables can be measured more accurately. Additionally, incorporating trap questions to exclude invalid responses is highly recommended, as it enhances the validity of the data, thereby improving the overall reliability of the research.

It is important to note that the respondents should hold ownership or have a significant role in shaping the direction of the business, such as business owners or high-level managers. Specifically, high-profile managers in divisions related to digital, operations, or marketing are ideal participants, as they are actively involved in implementing (advance) digital solutions, digital capabilities and enhancing the customer experience. However, accessing and engaging this target group can be challenging due to their high workload and limited accessibility. Therefore, the data collected for this research consisted of only 22 observations, which is considered relatively low. This poses challenges to the accuracy and reliability of the findings, leaving room for a higher margin of error. A larger sample size is recommended for future research to obtain more representative results and reduce the impact of outliers on the sample mean.

Moreover, this study represents only an incremental adaptation of the technology acceptance model. Future research should explore additional factors that influence the decision-making process of adopting Metaverse technology, aiming for a more comprehensive understanding of the topic. Qualitative research methods, such as interviews, could be employed to gain in-depth insights into the motivations of firms already implementing the technology, providing a deeper understanding of their drivers for adoption.

5.4 Conclusion

The aim of this study is to explore and quantify the relationship between Metaverse acceptance drivers (ease of usage, usefulness, and investment) and their influence on the interest in Metaverse, as well as the moderating effect of technology risk on this relationship. The research question addressed is: "How do acceptance drivers influence interest in Metaverse, and what is the impact of technology risk as a moderating factor?" The study collects data through an online survey, gathering responses from 22 business owners and high-level managers.

The statistical analysis is conducted using SPSS, specifically employing linear regression to test the hypotheses. The findings indicate that all identified acceptance drivers have a significant and positive influence on the interest in Metaverse. When considering the mediator variable, only the interactive effect between technology risk and ease of usage demonstrates a significant and positive influence on the relationship with interest in Metaverse.

A number of future research improvements for this research paper are identified. Firstly, a larger sample size is recommended to provide a better representation of the true population, thus enhancing the accuracy and validity of the findings. Additionally, pretesting the survey is suggested to refine the item phrasing, eliminating self-interpretation and improving the measurement's reliability. Lastly, future research should explore a more comprehensive list of potential Metaverse acceptance factors, as this paper presents only an incremental adaptation based on the technology acceptance model.

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Appendix

Appendix 1: Online survey question list

Is your business using or has the intention to implement Metaverse in the near future?

○   Yes, we are using Metaverse for the business

○   Yes, we plan to implement Metaverse in the near future

○   No, we have no intention to implement Metaverse anytime soon (yet)

What option below describes your business best?

○   Family-owned business

○   Local brand with many locations

○   International brand

On the scale of 1 to 5, how interested are you in using Metaverse for your business?

1	2	3	4	5
○	○	○	○	○

Not interested   Very interested

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Adopting any new technology under development always come with the risk of regulation, data security, and privacy. To what extent do these factors influence your willingness to use the Metaverse for your business on the scale of 1-5

	1 small extent				5 great extent
Metaverse collects a lot of sensitive and private information	○	○	○	○	○
Protecting data from hackers can be challenging	○	○	○	○	○
The technology is new that there is lack of regulation	○	○	○	○	○

What do you think about the usefulness of the Metaverse in the statements below on the scale of 1-5

	1 little use				5 very useful
Metaverse has potential to make better online website experience for the customer	○	○	○	○	○
Metaverse will be the new way to attract and interact with customer	○	○	○	○	○
Metaverse can help the business stands out from the competitors	○	○	○	○	○

How much do you agree to the following statements on the scale of 1-5

	1 totally disagree				5 totally agree
It is easy to understand Metaverse	○	○	○	○	○
It is easy to use Metaverse	○	○	○	○	○
It is easy to manage Metaverse	○	○	○	○	○

How much do you agree to the following statements on the scale of 1-5

	1 totally disagree				5 totally agree
You are willing to hire Metaverse specialists	○	○	○	○	○
You are willing to invest in the Metaverse infrastructures such as an IT server	○	○	○	○	○
You expect a high return from investing into the Metaverse for your business	○	○	○	○	○