T.C.

İSTANBUL KÜLTÜR UNIVERSITY

INSTITUTE OF GRADUATE STUDIES

THE INFLUENCE OF VIRTUAL REALITY ON THE TRADITIONAL MARKETING MIX ELEMENTS IN THE ARCHITECTURAL INDUSTRY: A STUDY IN SAUDI ARABIA

Master of Business Administration Thesis

Abdallah Mohammad Islam Heiasat
(1700004908)

Department: Business Administration

Program: Business Administration

Supervisor: Assist. Prof. Kemal Özkan Yılmaz

June 2024

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June 2024

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With gratitude,

Abdallah Heiasat

DEDICATION

This thesis is dedicated to my beloved family, your encouragement and understanding have meant more to me than words can express. Thank you for always being there for me.

This work is also dedicated to all those who strive for knowledge and progress in the face of challenges. May this thesis serve as a testament to perseverance, dedication, and the pursuit of excellence.

With heartfelt appreciation,

Abdallah Heiasat

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LIST OF ABBREVIATIONS

Abbreviation	Explanation
VR	Virtual Reality
3D	Three-Dimensional
BIM	Building Information Modeling
2D	Two-Dimensional
HMDs	Head-Mounted Displays
AI	Artificial Intelligence
SMEs	Small and Medium Enterprises
AR	Augmented Reality
ROI	Return on Investment

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ABSTRACT

The Influence of Virtual Reality on Marketing Elements in the Architectural Industry: A Study in Saudi Arabia

Abdallah Heiasat

This research presents a better understanding of the influence of virtual reality adoption on the traditional marketing mix elements 4Ps (product, price, place, and promotion) in the architectural industry in Saudi Arabia. The research investigates how Virtual Reality influences these marketing elements, aiming to enhance project outcomes and client satisfaction. Four hypotheses were formulated to assess VR's effect on each marketing component. The research targeted architectural companies in Saudi Arabia, diverse in services ranging from design to construction. Due to the challenge in specifying the number of active firms, a representative sample was chosen using non-probability convenient sampling, as geographical constraints necessitated quick and practical data collection. Following established research guidelines, a sample size of at least 400 respondents was determined adequate, aligning with the "10:1" rule for regression analysis. Data was collected through an online questionnaire completed by 400 participants, ensuring comprehensive responses with mandatory answer fields. The questionnaire, informed by prior validated tools and literature, covered aspects of virtual reality adoption and marketing strategies, providing a robust dataset for analysis. This study suggests incorporating VR into the architectural marketing mix can lead to more effective marketing strategies, improved project visualization, and enhanced client interaction. The study validates each hypothesis, demonstrating VR's transformative potential across all aspects of the marketing mix. Future research may delve into the long-term benefits of VR on customer satisfaction, the integration of VR with other emerging technologies, and comparative studies across different regions and cultural contexts to fully harness VR's potential in the architectural industry.

Keywords: Virtual Reality Adoption, Marketing Mix, Product, Place, Price, Promotion.

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ÖZET

Mimarlık Endüstrisinde Pazarlama Unsurları Üzerinde Sanal Gerçekliğin Etkisi: Suudi Arabistan'da Yapılan bir Çalışma

Abdallah Heiasat

Bu araştırma, Suudi Arabistan'daki mimarlık endüstrisinde sanal gerçekliğin benimsenmesinin geleneksel pazarlama karması unsurları 4P'ler (ürün, fiyat, yer ve tutundurma) üzerindeki etkisinin daha iyi anlaşılmasını sunmaktadır. Araştırma, proje sonuçlarını ve müşteri memnuniyetini artırmayı amaçlayan Sanal Gerçekliğin (VR) bu pazarlama unsurlarını nasıl etkilediğini araştırıyor. VR'nin her bir pazarlama bileşeni üzerindeki etkisini değerlendirmek için dört hipotez formüle edildi. Araştırma, Suudi Arabistan'da tasarımdan inşaata kadar çeşitli hizmetlerde bulunan mimarlık şirketlerini hedef aldı. Aktif firma sayısının belirlenmesindeki zorluk nedeniyle, coğrafi kısıtlamalar hızlı ve pratik veri toplamayı gerektirdiğinden, olasılığa dayalı olmayan uygun örnekleme kullanılarak temsili bir örnek seçilmiştir. Yerleşik araştırma yönergeleri izlenerek, regresyon analizi için "10:1" kuralına uygun olarak en az 400 katılımcıdan oluşan bir örneklem büyüklüğünün yeterli olduğu belirlendi. Veriler, 400 katılımcının doldurduğu çevrimiçi bir anket aracılığıyla toplandı ve zorunlu yanıt alanlarıyla kapsamlı yanıtlar sağlandı. Daha önce onaylanmış araçlar ve literatürle desteklenen anket, sanal gerçekliğin benimsenmesi ve pazarlama stratejilerinin çeşitli yönlerini kapsayarak analiz için sağlam bir veri seti sağladı. Bu çalışma, sanal gerçekliği mimari pazarlama karışımına dahil etmenin daha etkili pazarlama stratejilerine, gelişmiş proje görselleştirmesine ve gelişmiş müşteri etkileşimine yol açabileceğini öne sürüyor. Çalışma, her hipotezi doğrulayarak VR'nin pazarlama karmasının tüm yönlerinde dönüştürücü potansiyelini ortaya koyuyor. Gelecekteki araştırmalar, VR'nin müşteri memnuniyeti üzerindeki uzun vadeli faydalarını, VR'nin diğer gelişen teknolojilerle entegrasyonunu ve VR'nin mimari endüstrisindeki potansiyelinden tam olarak yararlanmak için farklı bölgeler ve kültürel bağlamlar arasında karşılaştırmalı çalışmaları araştırabilir.

Anahtar Kelimeler: Sanal Gerçeklik, Pazarlama Karışımı, Ürün, Yer, Fiyat, Tutundurma.

CHAPTER ONE: INTRODUCTION

The concept of virtual reality has a longstanding history, dating back to the 1970s, however, the word was not coined until the 1980s (Barnes S., 2016). Although it initially gained traction in sectors such as the military, VR has experienced a remarkable expansion into a wide range of fields. Its applications extend beyond the military to include education, psychiatry, scientific research, architecture, entertainment, and even industries like video games and film (Delgado et al., 2020). As a well-established technology, VR seamlessly blends real-world visual perception with computer-generated environments, offering users a captivating experience (El Beheiry et al., 2019).

Virtual Reality is defined as the replication of an actual or hypothetical environment that is perceptible in three dimensions – width, height, and depth. This immersive experience often extends beyond mere visual engagement, offering real-time motion, sound, and occasionally, tactile and other forms of sensory feedback, thereby enhancing the user's interaction with the virtual environment (Onyesolu & Eze, 2011).

Fundamentally, VR is designed to create an illusion of presence or 'being there.' It aims to provide visual cues one would perceive if physically present in that setting. Crucially, it isn’t just about displaying a static image; the technology ensures that the visuals adapt instantly to changes in the user’s viewpoint, thereby rendering a more dynamic and realistic experience (Lee & Smith, 2004).s

One of the key elements of VR is its ability to convey a sense of depth. This is achieved through a technique known as eye parallax, where each eye receives a slightly different image. This method is particularly effective for objects that are close to the viewer. For distant objects, which appear almost identical to each eye, the technique has less impact. Typically, VR involves donning a helmet equipped with goggle-like displays for each eye, each providing a distinct perspective of the environment. These displays update rapidly in response to head movements, creating a convincing sense that the user is actively exploring the virtual space. This sensation is heightened by the system's tracking of the user's movements, despite the user perceiving it as a result of their own volition (Onyesolu & Eze, 2011).

1.1 Virtual Reality in Architecture

Virtual Reality Adoption holds significant relevance in the fields of Architecture, Engineering, and Construction, primarily due to the inherent reliance of these sectors on three-dimensional (3D) spatial concepts. The built environment's fundamental connection to 3D space means that Architecture, Engineering, and Construction professionals depend extensively on visual representations for effective communication (Delgado et al., 2020). This article will explore the applications of VR within the Architecture, Engineering, and Construction sectors, focusing specifically on its role and impact during the design and construction phases.

For instance, in their research, (Dunston et al., 2011) introduced a VR system specifically for the design review of hospital patient rooms, noting that VR-enhanced design reviews foster better interaction and significantly influence design decision-making. Additionally, (Boton, 2018) developed a method to aid constructability analysis meetings using VR. This method incorporates BIM-based construction simulations into VR applications for more immersive visualizations.

However, the implementation of VR for design review is not without challenges. One of the primary obstacles is the difficulty in translating design alterations back into BIM

models and documenting the experiences and discussions that occur within VR settings. These challenges have been partly tackled by (Dris et al., 2019) who proposed an ontology for establishing a bi-directional connection between BIM models and VR applications. This development marks a significant step toward integrating VR more seamlessly into the design and review processes.

Professionals in the architecture sector can effectively explore and evaluate design concepts, simulate real-world scenarios, and optimize spatial configurations, ultimately leading to improved design outcomes and the efficient utilization of resources by employing virtual reality technology (Delgado et al., 2020).

Virtual Reality has been developed primarily to improve collaborative decision-making and problem-solving procedures throughout the conceptual design phase (Sun et al., 2018).

When comparing visualization on a conventional computer monitor to VR, there are notable distinctions in user experience. Traditional computer monitors typically present 2D representations of architectural designs, allowing users to interact using input devices like keyboards and mice. However, the experience remains limited to a flat screen, lacking depth perception and a fully immersive or realistic feel. Although computer monitors offer convenience and accessibility, they do not provide the heightened sense of presence and engagement offered by VR (Paes et al., 2017).

On the other hand, VR revolutionizes visualization by creating an immersive, 3D environment. By utilizing head-mounted displays (HMDs), VR technology transports users into a virtual world, providing a heightened sense of presence. This immersive experience allows users to interact with architectural designs more intuitively and realistically, enabling the exploration of 3D spaces and enhancing their understanding of scale, depth, and spatial relationships (Delgado et al., 2020).

Building representations that accurately represent real-world human experiences helps to construct buildings that satisfy end-user objectives in terms of technical, usable, and representational elements. By incorporating VR, architects, and designers may create rich

experiences that boost user engagement and satisfaction, resulting in buildings that meet the various expectations and preferences of the intended users (Paes et al., 2017).

Despite the numerous advantages offered by Virtual Reality technology in architectural design, certain limitations need to be considered (Håkansson L., 2018). Virtual Reality technology is currently undergoing continuous development and experiencing rapid growth. The scarcity of research in this domain can be attributed to the complex nature of virtual reality, which often necessitates users and researchers to venture beyond the confines of their original areas of expertise. Therefore, it is important to recognize the ongoing evolution of VR and encourage exploration and experimentation, allowing for a deeper understanding of its capabilities and potential applications (Paes et al., 2017).

1.2 Marketing Mix in Architecture

Marketing has a significant role in increasing architectural project awareness, involvement, and success. The marketing mix was described by experts as a collection of manageable marketing instruments used by a business to elicit a particular response from its target market. The Four P's, or the marketing mix parts of the product, pricing, place (location of distribution), and promotion, are also used to refer to and describe the term "marketing mix" (Khan, 2014).

The experts have defined the four Ps of the marketing mix. The term "promotion" encompasses various marketing communication activities such as advertising, sponsorship, public relations, and direct marketing. The promotion component of the marketing mix includes all communication-related skills and advertising creativity (Kamasak, 2013). The "product" aspect relates to the goods' attributes, benefits, and quantity, enabling the company to offer high-quality products. Pricing decisions involve setting competitive rates and considering factors such as item cost, product lines, pricing adjustments, and payment options. The concept of "place" covers distribution methods and the physical or virtual location where customers can access the product or service.

The convenience and ease of purchase for the customer are also indicated by the chosen location (Khan, 2014).

This thesis aims to investigate how Virtual Reality Adoption affects the four key marketing factors known as the 4 Ps: product, price, place, and promotion. This study intends to shed light on the unique use and consequences of VR on marketing elements in the architectural sector in Saudi Arabia.

1.3 Research Problem

In the Kingdom of Saudi Arabia, the domain of architecture has experienced a significant metamorphosis beginning in the late 1960s and extending into the early 1970s, a change that can largely be attributed to shifts in economic conditions and regional dynamics (Al-Hathloul & Mughal, 2004). The period from the 1970s to the present has seen the Saudi government play a pivotal role in shaping the architectural landscape through its institutions, embarking on numerous new projects. These endeavors have significantly contributed to the architectural evolution within the country, fostering the development of a modern architectural identity.

Architectural design has embraced a new, digital media in place of the conventional paper, pen, and model with the use of computers, especially with the computerized shift in architectural design (Danaci & Çakmak, 2022).

With increasing global competitiveness, the architectural sector faces unprecedented challenges. Firms are striving to bridge the widening gap between customer demands and market offerings, especially in light of swift shifts in consumer preferences (Kamasak, 2013). Furthermore, architects nowadays are not solely driven by traditional motivations like art interest or technical drawing. In today's fiercely competitive market, they also need to possess commendable marketing, financial, and communication skills to stand out (Bozdogan, 2014).

In the contemporary global marketplace marked by its dynamism, marketers must evolve, ensuring they possess both clarity and agility. Unique marketing capabilities are now at the forefront, making it vital for architectural professionals to be proficient in both their

craft and entrepreneurial endeavors (Kamasak, 2013). Moreover, the changing nature of architectural professionalism demands more than just creativity; it requires innovation in product marketing as well (Bozdogan, 2014).

Virtual Reality Adoption has undergone extensive testing and application in stakeholder engagement within the real estate sector. (Juan et al., 2018) have highlighted VR's exceptional capability to submerge stakeholders into a virtual setting, thereby enabling them to visualize and feel the final product. Moreover, (Xia, 2013) introduced a VR system specifically designed for campus virtual walkthroughs. Recent research in this field has predominantly concentrated on developing multi-user functionalities (Du et al., 2018), for instance, unveiled a multiuser VR platform that facilitates interaction among various parties, such as clients, architects, engineers, and general contractors, in a shared VR space. This innovation significantly enhances stakeholder engagement and communication.

However, the integration of VR in stakeholder engagement encounters several challenges. Firstly, the user interface often lacks user-friendliness, necessitating the presence of a chaperone for most users. Secondly, users may experience a feeling of isolation when engaging with VR. Lastly, sharing VR experiences is not straightforward, presenting a barrier to wider adoption and use. These challenges highlight the need for further refinement in VR technology to make it more accessible and collaborative for all users (Davila et al., 2020).

The establishment of the Saudi UK Tech Hub and substantial investments aimed at enhancing digital skills. The nation's emphasis is on cutting-edge technologies including AI, 3D Printing, and VR, underscoring its ambition to evolve into a leading tech hub (Ollen Group, 2021).

Furthermore, the Saudi Arabian government is significantly investing in the development of infrastructure, with a special emphasis on building economic cities. These cities are key to diversifying the economy into new sectors such as healthcare, information technology, and advanced manufacturing (Export.gov, 2020).

The study intends to provide insights into how digital advancements like Virtual Reality Adoption can be harnessed to address the challenges and capitalize on the opportunities in the evolving architectural marketing landscape.

1.4 Research Questions

The following research questions were come up with by the study's purpose and objectives:

1. What is the effect of virtual reality on the marketing element "place"?
2. What is the effect of virtual reality on the marketing element "price"?
3. What is the effect of virtual reality on the marketing element "product"?
4. What is the effect of virtual reality on the marketing element "promotion"?

1.5 Study Purpose and Objectives

This thesis aims to:

1. Fill a gap in the literature by improving understanding of the possible influence of Virtual Reality Adoption on architectural marketing aspects in Saudi Arabia.
2. Give significant insights to marketing researchers and practitioners by concentrating on the application of VR in the architecture industry's marketing practices, allowing them to effectively utilize the new technology of VR.
3. Investigate how VR might impact customers' perceptions of value during the pre-purchase stage through a detailed assessment of the buyer-supplier relationship setting in the architectural marketing area as well as provide valuable directions for future research and assist architectural marketers in leveraging VR to enhance their marketing strategies and offerings in the Saudi Arabia market by understanding how VR can contribute to desired outcomes and influence architectural marketing elements (Product, Price, Place, and Promotion).

1.6 Scope and Limitations

VR technology immerses users in a virtual environment, giving them a stronger sensation of presence. With the help of this immersive experience, users may engage with architectural designs more naturally and accurately, allowing them to explore 3D environments and better comprehend scale, depth, and spatial connections.

Virtual reality systems continue to face several technological issues. Because even minor monitor problems might result in visible misregistrations between actual and virtual elements, virtual reality requires extremely accurate screens (Fakahani et all, 2022).

1.7 The Significance of the Research

This study explores the influence of Virtual Reality Adoption on architectural marketing elements, specifically the 4 Ps, within Saudi Arabia's context. It is pioneering in Saudi Arabia in its emphasis on the architectural sector. What distinguishes it from previous research is its specialized attention to the traditional marketing mix elements such as product, price, place, and promotion, all of which can amplify the Virtual Reality Adoption process within the architectural domain. Moreover, this research represents one of the most contemporary examinations of Virtual Reality Adoption within a particular industry.

1.8 The Flow of the Chapters

The study is divided into five chapters:

The study is introduced and described in the first chapter. It takes into account some of the body of prior information, the main objective and goals of the study, and its applicability. Additionally, research hypotheses were developed.

The theoretical justifications for speculating on the conceptual model in question are illustrated in the second chapter. Conceptually, the link between the variables is studied.

Chapter Three fully outlines the method used to address the investigation's main challenge. The study's design, sample selection, and data collection methods are further described. It also covers measurement methods, research hypotheses, statistical analysis, item and dimension analysis, and handling data that are missing.

The findings of the investigation are illustrated in Chapter Four.

Chapter Five illustrates the key results, consequences, limits, suggestions, and further study directions.

CHAPTER TWO: LITERATURE REVIEW AND THEORETICAL BACKGROUND

This section delves into the intersections of architectural processes, virtual reality, and marketing mix components, exploring how VR technology reshapes traditional marketing paradigms within architectural practice.

2.1 The Architectural Process

The process of architectural design unfolds through several distinct phases: beginning with schematic design, advancing to design development, followed by presentation and evaluation, proceeding to the detailed development and the creation of construction documents, then moving onto bidding, and culminating in the administration of the construction phase. In the initial schematic design phase, the foundational characteristics of the building are delineated, key issues are pinpointed, and preliminary design choices are formulated. The subsequent design development phase further refines the project, detailing the specific nature and overarching goals of the entire endeavor (Campbell & Wells, 1994).

The iterative phase of presentation and evaluation involves the submission of proposals for assessment by a client, review board, or design jury, leading to the finalization of design decisions. Upon design approval, the focus shifts to the elaboration of details and the production of construction documents, which comprise both working drawings and written specifications that collectively provide a legal outline of the proposed construction. As the completion of these documents approaches, they are made available for bidding, resulting in the selection of a contractor. The concluding phase sees the

architect overseeing the construction process, making interpretative decisions on changes, and evaluating performance, thereby ensuring that the project is executed according to the envisioned design and standards (Campbell & Wells, 1994).

In this thesis, we will focus our examination on the design process. The design journey initiates with the recognition and definition of problems at the initial conceptualization phase (Yessios, 1987). Throughout the design journey, across various stages, designers employ various forms of representations to articulate their visions concerning the functionality and aesthetic qualities of the object being designed. These representations vary in the level of detail they provide at different stages of the design process. In the preliminary stages, where problems are being defined, designers tend to rely on more symbolic and abstract forms of representation, such as diagrams or schematics. As the design progresses, these representations evolve into more detailed and concrete depictions that illustrate the intended physical manifestation of the design.

The design activities involved in this process are broadly classified into two categories: generative, which involves the creation of partial solutions, and evaluative, which focuses on assessing these solutions (Coyne & Subrahmanian, 1993). In the fields of architecture and engineering, there's a significant emphasis on the evaluative phase, particularly in examining the viability of proposed solutions. This evaluation, aimed at identifying potential failures in terms of the program, spatial functionality, or overall performance, is a crucial part of what is known as a design review.

For an effective evaluation and critique, a deep understanding of the design is imperative. Throughout this process, both external representations (like drawings or scale models) and internal representations (such as mental visualizations) are instrumental. They facilitate a comprehensive understanding of both the design problem and its proposed solutions, enabling a substantive critique (Kalisperis et al., 2002). An effective external representation, therefore, minimizes the need for translation and enhances the ease of communication and evaluation of ideas. By addressing cognitive constraints, a well-chosen representation can significantly bolster the reasoning and creative process (Rice, 2003).

2.2 Virtual Reality

Virtual Reality technologies, as described by (Milgram & Colquhoun, 1999), involve visualization techniques known as pure virtual presence. These technologies are increasingly gaining traction for their potential to enhance professional communication and shared spaces. Additionally, Gartner (2018) highlighted VR as a pivotal strategic technology, with forecasts showing its significant evolution up until 2028.

Architecture stands as a prime domain for the application of virtual reality, offering a significant enhancement in experiencing structures yet to be realized (Franco, 2018). Professionals have discovered a broad spectrum of uses for virtual reality visualization, spanning from initial design evaluations to the realm of marketing. This innovation introduces novel methods for presenting and comprehending the functionality of environments or facilities that are in the planning stages (Fakahani et al., 2022).

For instance, traditional blueprints provide only a flat, two-dimensional view of a project, and even three-dimensional models displayed on standard computer screens fail to fully convey the spatial dynamics of a structure. Virtual reality, however, presents an immersive exploration that closely mimics the experience of navigating the actual building. Beyond merely visualizing virtual spaces, virtual reality is also employed in the actual creation and conceptualization of these environments (Fakahani et al., 2022).

Recent research has underscored the effectiveness of virtual reality adoption in enhancing design activities, with comparisons drawn between VR and traditional, non-immersive methods revealing significant advantages. Immersive VR environments have been shown to foster more engaging and stimulating design experiences, facilitating a more integrated approach to concept development. Such environments have been credited with fostering greater involvement and delivering more gratifying experiences for participants (Houzangbe et al., 2022; E. K. Yang & Lee, 2020; Obeid & Demirkan, 2020).

VR has been recognized for its ability to elevate the quality of creative outputs and improve performance throughout the design process, including in phases of design and planning, testing and modification, as well as in ideation and collaboration (X. Yang et

al., 2018; Y.-S. Chang, Kao, & Wang, 2022). These findings collectively highlight VR's transformative potential in streamlining and enriching architectural design practices.

In the realm of practical applications, VR has undeniably showcased its prowess. For instance, architectural trainees can now immerse themselves in 3D object-based spaces instead of relying solely on traditional drawings. Furthermore, while earlier 3D education methodologies were largely mouse or keyboard-driven, today's VR capabilities allow instant visualization of interactive actions like pulling and grabbing, thereby enhancing the real-time experience (Park et al., 2015). Nevertheless, with advancements come complexities. VR can be broadly segmented into four primary categories: desktop-based VR, immersive VR, BIM-enabled VR, and AR, as noted (Milgram & Colquhoun, 1999).

Desktop-based VR, a subcategory of VR, essentially transforms a regular computer monitor into a VR platform. This technology eliminates the need for any advanced tracking equipment, solely relying on the user's innate spatial understanding and perception. It offers a cost-effective VR solution as it utilizes standard computer accessories like monitors, keyboards, and mice (Chen et al., 2007).

Conversely, immersive VR offers a more engaging experience by leveraging specialized hardware like HMDs and sensor gloves. Such technology plunges users into a deeply engrossing virtual realm, accentuated by vivid visuals and sounds, making the environment seem authentic (Waly & Thabet, 2003). The use of HMDs often leads to user discomfort and hinders accurate depth perception (Kerawalla et al., 2006).

The fluidity of immersive VR is such that any movement by the user in the physical world is mirrored in the virtual scenario. Moreover, the integration of various sensors in accessories offers real-time feedback, further enriching the experience (Ausburn & Ausburn, 2004).

BIM-enabled VR is another category worth noting. This VR type revolves around 3D object creation (Gheisari & Irizarry, 2016). BIM-enabled VR offers an immersive visualization environment, allowing users to inspect designs in great detail and make real-time alterations.

However, it's worth noting that challenges hinder VR's universal adoption. Potential users might either be unfamiliar with its intricate workings, experience physical discomfort while using it, or remain unconvinced of its practical benefits. Issues such as privacy concerns, and visual rendering imperfections must be addressed promptly as technology evolves (Wedel & Kannan, 2016).

Leveraging the potential of virtual reality, this technology serves as a pivotal instrument for architects and related professionals in the crafting and refinement of design prototypes with enhanced efficacy. Virtual reality adoption extends its utility beyond mere structural conceptualization, encompassing both interior and exterior design realms, thereby facilitating improved design outcomes. This multifaceted application underscores the technology's significant role in advancing architectural practices (Fakahani et al., 2022).

From my perspective, while the growth of VR is promising and its potential applications in various sectors are vast, it is crucial to ensure user comfort and address existing limitations for its mainstream adoption. The future of VR looks bright, but meticulous refinements and user-centric enhancements will determine its long-term success.

2.3 The Traditional Marketing Mix

Jobber (2007) emphasizes the robustness of the 4Ps approach, stating that it serves as a memorable and practical framework for making marketing decisions. Widely endorsed, the 4Ps have become synonymous with the term "Marketing."

The final decades of the 20th century have witnessed substantial transformations in consumer needs, behaviors, and nature, driven by significant cultural, social, demographic, political, and economic influences, coupled with rapid technological advancements. Researchers note a shift in the modern consumer, characterized as existential, less responsive to traditional marketing stimuli, and exhibiting reduced sensitivity to brands and marketing cues. Capon & Hulbert (2000) and Lewis & Bridger (2000) highlight the modern consumer's characteristics, describing them as demanding, individualistic, involved, independent, well-informed, and critical. This shift is

underpinned by increased consumer power and sophistication, facilitated by affordable personal computing power and easy access to global online platforms.

These developments exert pressure on marketers to move away from mass marketing strategies and adopt personalized, interactive, and direct communication methods with customers. This shift enables marketers to enhance communication with target groups, identify evolving customer needs, respond promptly to competitive dynamics, and anticipate market trends with precision.

Effective resource allocation is pivotal for managers aiming to achieve a variety of goals, particularly for marketing managers tasked with distributing resources among the key components of the marketing mix. researchers suggest that a marketing-centric approach will become deeply embedded within an organization's culture (Chemo et al., 2023).

As the marketing landscape evolves towards a more integrated approach, the traditional 4Ps model—Product, Price, Place, Promotion—no longer suffices for all companies. Moreover, the introduction of Policy as a decision-making variable in the marketing mix underscores the strategic role managers play in guiding corporate decisions through the evaluation of various elements' competitive advantages. Policies, by their nature, are designed to be pragmatic and subject to objective evaluation, thereby aiding in the strategic decision-making process by assessing the efficacy of existing practices (Chemo et al., 2023).

2.4 The Place Component of the Marketing Mix

In the realm of marketing, "place" plays a pivotal role. As described by Riaz and Tanveer (n.d), it pertains to ensuring a product's accessibility to the intended audience. On the other hand, Goi (2011) elucidates this concept further by defining the "place strategy" as the tactics a business employs to distribute its product or service to its consumers. Similarly, as noted by Muala and Qurneh (2012) and originally conceptualized by "place" can be associated with factors like a service's location and its distribution channels which contribute to a potential customer's perception of a product's accessibility.

Diving deeper into distribution mechanisms, Riaz and Tanveer (n.d) indicate that organizations can utilize a range of channels to ensure their product reaches the customer. Notably, these pathways can be both direct and indirect. However, a crucial consideration lies in selecting the channel; this choice can profoundly impact sales volumes. As corroborated by Goi (2011) and Muala and Qurneh (2012), effective distribution within chosen marketing avenues be it wholesalers or retailers is essential for the "place strategy" to thrive. Furthermore, a distribution system is viewed as a pivotal external resource.

The significance of place decisions stems from their inherent nature—where product availability and consumption coincide temporally and spatially. This requires a location that offers comprehensive data about customers, market competitors, promotional efforts, and other marketing activities. Establishing such a distribution system is a long-term endeavor; it cannot be easily altered. Consequently, it stands on par with critical internal resources of a company like manufacturing and research. Moreover, it embodies a commitment to specific practices and policies, forming the bedrock for long-term affiliations.

In conclusion, the decision of how and where to place a product is multi-faceted. Careful consideration of both direct and indirect channels is crucial to ensure that the product not only reaches its intended audience but also maintains its brand integrity and value.

2.4.1 The Effect of Virtual Reality on Place

Virtual Reality significantly reshapes the "Place" aspect of the marketing mix, enhancing product accessibility and distribution efficiency. As noted by Fanto (2021), the widespread availability of a product in various markets boosts consumer confidence, emphasizing the importance of strategically located, accessible distribution points with comprehensive facilities to positively affect purchasing decisions.

VR technologies streamline the decision-making process for stakeholders in architecture, real estate, and interior design. For instance, the VR application Ikea Place, highlighted by Wired in 2017, revolutionizes how customers select and visualize furniture in their homes, offering a practical solution to space measurement and aesthetic integration

challenges. Similarly, VR's role in real estate, enables potential buyers to virtually tour properties, thereby saving time and reducing travel expenses. This virtual engagement is anticipated to become a standard practice in real estate marketing (Håkansson L., 2018).

Furthermore, VR provides architects with advanced tools for transitioning from traditional 2D blueprints to dynamic 3D models, facilitating clearer communication and collaboration between designers, clients, and end-users. This immersive approach allows for a deeper understanding of design implications, enhancing the overall design and decision-making process (Håkansson L., 2018).

These insights underscore the transformative impact of VR on the "Place" component within the marketing mix of architectural design, illustrating its capacity to bridge the gap between physical and virtual product presentations and engagements.

2.5 The Price Component of the Marketing Mix

Understanding customer experience is crucial in enabling a product or service provider to discern the foundational principles that satisfy customers. Especially when intertwined with the marketing mix, specifically the pricing component, meeting customer expectations becomes even more demanding. Pricing strategy, as a core component of business strategy, demands rigorous analysis. The goal is twofold: to avert potential pricing blunders and to chart a course toward profitability. Thus, it becomes indispensable to fathom how costs influence both pricing and profit margins. Consequently, this comprehension should cohesively blend cost factors with market-driven pricing while considering profitability dimensions (Al-Fadly, 2020).

Furthermore, price is characterized as the monetary sum a customer shells out for a product or service. Within a corporate setting, the task of determining this price rests with the management, using their chosen pricing strategy—a task recognized as pivotal for any enterprise. This strategy meticulously scrutinizes potential pitfalls in pricing, aiming to forestall them, while simultaneously laying out a roadmap for profit generation. As such, grasping how cost dynamics impact pricing and potential earnings becomes imperative.

This grasp should seamlessly weave cost considerations into market-oriented pricing, ensuring profitability (Ali et al, 2013).

Moreover, it ought to maximize value extraction through pricing segmentation, tweak strategies according to evolving product life cycles, and formulate models to forecast buying patterns. Subsequently, it becomes essential to pinpoint any limitations that might impede the pursuit of maximum profitability (Ali et al, 2013).

2.5.1 The Effect of Virtual Reality on Price

Research in the realm of virtual visualization and technology has gleaned insightful findings about their impact on consumer behavior. For instance, Li et al (2008) revealed that the use of 3D virtual product visuals can amplify positive brand perceptions and elevate the likelihood of purchases. In contrast, Martínez-Navarro et al (2018) illustrated how VR has the potential to influence a consumer's intention to purchase. This influence stems from the profound sense of presence and distinct emotions elicited by the immersive virtual surroundings.

Diving deeper into the tactile elements, Heller et al (2019) established those haptic interactions, or those involving touch, had a more pronounced effect on a consumer's readiness to spend compared to voice-activated controls. This was attributed to the heightened sense of tangibility haptic controls provide. Similarly, Valenzuela and Hadi (2020) argued in favor of haptic feedback, demonstrating its capability to bolster task execution by amplifying the sense of social proximity. On the experiential front, Schlosser (2003) asserted that interactive elements can drive purchase decisions by conjuring vivid mental visuals associated with using the product.

Furthermore, there's growing evidence to suggest that the medium of content can sway public sentiment toward social causes. For instance, Kandaurova and Lee (2019) pointed out that virtual content, when juxtaposed against traditional video formats, can better mobilize people to donate both their time and financial resources. The enhanced sense of spatial awareness facilitated by AR fosters more informed decision-making processes.

In summary, a considerable chunk of academic endeavors has shed light on the nexus between immersion, presence, consumer experiences, and their efficacy predominantly in the initial buying stages. However, it's noteworthy, and perhaps a potential shortcoming, that scant attention has been accorded to the aftermath of the purchasing process, especially when broaching functional application contexts.

2.6 The Product Component of the Marketing Mix

Several scholars and publications have extensively discussed the concept and facets of 'Product' in the context of marketing and its significance to companies. Specifically, Riaz and Tanveer (n.d), Goi (2011), and Muala & Qurneh (2012) have elucidated, drawing from various studies, that a 'Product' refers to any good or service introduced into the market by a company. They further detail the product as an entity that captivates customer attention prompts acquisition or consumption, and ultimately fulfills a particular want or need. This definition is expansive, encompassing not just tangible items but also services, people, places, organizations, and even ideas.

In the world of marketing, it is fundamental for a marketer to think beyond the basic utility of a product. Hence, products are viewed in three layers: core, actual, and augmented. The 'Core Product', as highlighted, addresses the primary problem-solving attributes or the essential benefits that customers seek. Contrarily, the 'Actual Product' pertains to the tangible aspects of the product such as its design, quality, features, brand identity, and packaging, all of which collaborate to deliver the core benefits. Moreover, the 'Augmented Product' realm comprises additional offerings or perks enveloping the core and actual product. This includes elements like warranties, post-purchase services, and installation to name a few. Hirankitti et al. (2009) expand on this by indicating that when we discuss services as products, they too can be bifurcated into core and secondary services. While the core service offers the principal benefit, secondary services encapsulate both tangible and augmented levels, often discernible in their delivery methodology.

Furthermore, Hartline and Ferrell (2005) contend that the product remains central to the marketing mix strategy. Meanwhile, Borden (1984) classifies the product based on attributes like quality, design, brand identity, and size. Undoubtedly, the consumer's reception of a product hinges on its design and quality. However, it's worth noting that services accompanying the sale, both before and after, play a pivotal role in enhancing a product's appeal. Additionally, expansive product lines not only pave the way for heightened sales in export markets but also bolster profitability. By diversifying product offerings, companies can fortify their market standing both domestically and internationally.

2.6.1 The Effect of Virtual Reality on Product

Virtual Reality has revolutionized the architectural design process, specifically in product development and marketing, by enabling the simulation of real-world processes and enhancing product designs to meet market demands efficiently. This technology supports prototype design and marketing, offering a rapid response to market requirements and enhancing product quality, thus addressing consumer acceptance uncertainties (Choi & Cheung, 2008; Bae & Leem, 2014).

Furthermore, VR's application extends to teleoperation in hazardous environments and detailed design processes. It not only fosters innovation but also aids in incremental innovation by reducing time and costs, thereby shortening the product innovation cycle and enhancing quality. This is crucial for industries aiming to reduce time-to-market and involves consumers and stakeholders in the development process (Souza et al., 2006; Hoffmann et al., 2006).

VR simulations play a critical role in assessing and refining product designs in an iterative process, thus reducing the costs associated with the manufacturing and material usage of prototypes (Choi & Cheung, 2008; Lawson et al., 2016).

Jiang & Benbasat (2004) identified two types of virtual controls—visual and functional—that are key in product evaluation, enabling users to interact with and understand products in a virtual environment. This immersive experience enhances consumer confidence in

their purchasing decisions and provides architects with a powerful tool for engaging consumer interest, thereby enriching the product selection process in the architectural design sphere (Aofeng & Han, 2016).

These insights emphasize VR's transformative impact on the architectural design process, highlighting its potential to bridge the gap between conceptual design and consumer engagement.

2.7 The Promotion Component of the Marketing Mix

Promotion, in the marketing realm, represents an amalgamation of strategies aimed at amplifying product visibility and creating a positive public perception. This is achieved through a diverse range of channels encompassing traditional advertising, word of mouth, direct mailing, electronic mail, and the pervasive world of social media. Effectively, promotion weaves together the foundational three Ps of marketing: product, price, and place, striving to present them in perfect harmony, so the offer becomes all but irresistible to potential customers. However, while the goal is enticing, ensuring synchronization across these aspects requires precision and foresight (Ross, 2012).

Consequently, a well-orchestrated communication program stands as a pillar in marketing strategies. The significance of such a program lies in its trifecta of roles: imparting essential information and guidance, molding consumer perceptions to highlight the unique strengths of a product, and nudging them toward timely action (Lovelock & Wright, 2002). Yet, while the value of promotional activities, spanning from advertising and sales initiatives to personal selling and broader publicity, cannot be understated in shaping consumer perspectives, feelings, experiences, and ultimately, their buying decisions, they also come with challenges. Notably, marketers face the daunting task of crafting messages that resonate consistently across their product range. Moreover, these messages need to be positioned within media platforms frequented by their target demographic (Munusamy & Hoo, 2008).

To distill it down, promotion is much more than a mere selling tactic; it is the very essence of a successful marketing campaign, deeply intertwined with effective communication. Its paramount importance stems from its role in enlightening potential buyers about products, guiding their decisions, and molding their actions. However, for these promotions to truly strike a chord, they must be disseminated through appropriate channels, whether that's individual sales representatives, television and radio broadcasts, digital platforms, printed magazines, or other media outlets.

2.7.1 The Effect of Virtual Reality on Promotion

The influence of Virtual Reality on the promotional aspect of the marketing mix within the architectural design process is significant, as highlighted by various studies (Audly et al., 2023). Enhanced promotional activities, such as advertising, sales promotion, and direct marketing, have been shown to increase consumer interest in VR products substantially. The implementation of promotions, offering rewards such as discounts and attractive prizes, plays a pivotal role in augmenting consumer purchasing intent. This relationship underscores the critical impact of well-crafted promotional strategies on the inclination of consumers to engage with VR technologies (Guixere et al., 2019).

In the context of architectural design, VR's application extends beyond mere visualization, serving as a potent educational tool. It facilitates an immersive learning experience, allowing for a deeper understanding of architectural concepts and skills crucial for professional development. Before the widespread marketing of VR as an educational aid, thorough market research is essential to devise an effective strategy that ensures the marketing efforts align closely with consumer needs and preferences (Audly et al., 2023).

The marketing mix elements—product, price, place, and promotion—demand careful consideration within the architectural process. Price and distribution channels, in particular, exhibit a strong correlation with purchasing decisions, highlighting the importance of a comprehensive and well-integrated marketing strategy to leverage VR in architectural practice effectively (Audly et al., 2023).

In the evolving landscape of architectural design, the integration of VR into promotional strategies plays a pivotal role. For instance, the creation of virtual flagship stores within VR environments offers a novel avenue for architects and designers to showcase their projects and concepts. This approach not only enhances visibility through virtual events and press releases but also aligns with the digital transformation trends in marketing (Loureiro et al., 2019).

Moreover, the utility of VR extends to SMEs, which can utilize virtual platforms for advertising and customer engagement. Unlike traditional media, virtual magazines and newspapers offer a dynamic and interactive way to connect with audiences, fostering a deeper brand-customer relationship. Additionally, VR platforms facilitate internal communications, enabling virtual meetings that transcend geographical limitations, thereby enhancing collaboration among employees and partners globally (Loureiro et al., 2019).

VR emerges as a powerful tool that bridges theoretical knowledge with practical application. By simulating real-world marketing scenarios, VR provides managers with experiential learning opportunities, allowing them to undertake branding and advertising projects with a hands-on approach (Loureiro et al., 2019).

These examples underscore the transformative potential of VR in the promotion of marketing elements within the architectural design process, illustrating its capacity to revolutionize traditional approaches through immersive, interactive experiences that engage consumers and stakeholders.

2.8 Conceptual model

Based on the research objective and the questions derived from it, the following conceptual model has been formulated to investigate the impact of Virtual Reality on Marketing Elements, as depicted in Figure 1:

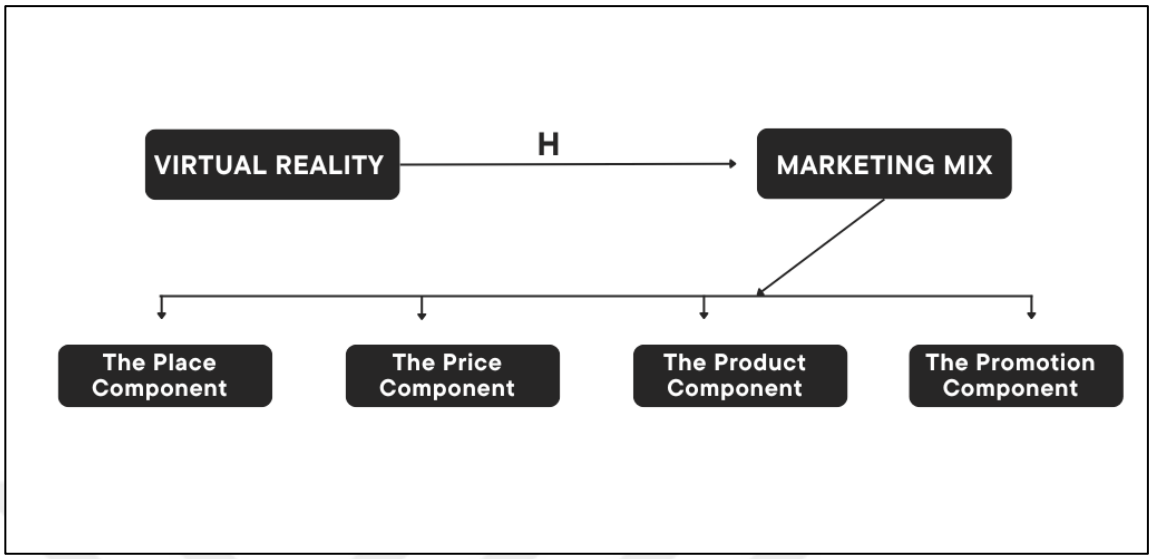

Figure 1: The Conceptual Design

Sources: (The Researcher Built the Questionnaire depending on variables definitions in previous studies. These studies were mentioned in chapter two of this dissertation).

2.9 Study Hypotheses

The following hypotheses have been formulated to investigate the impact of virtual reality on various marketing elements within the architectural industry in Saudi Arabia.

1. Hypothesis (H1): Virtual reality has a significant positive effect on the marketing element "Place".
2. Hypothesis (H2): Virtual reality has a significant positive effect on the marketing element "Price".
3. Hypothesis (H3): Virtual reality has a significant positive effect on the marketing element "Product".
4. Hypothesis (H4): Virtual reality has a significant positive effect on the marketing element "Promotion".

CHAPTER THREE: METHODOLOGY

3.1 Introduction

In the previous chapter, a conceptual model was constructed that demonstrated the link between virtual reality and the marketing elements variable components in Saudi Arabia's **architectural industry**. This chapter will offer a comprehensive description of the main research methodology that was used to provide an answer to the research question. To do this, one must place primary emphasis on the research technique, which comprises the study design, procedures, respondents, instruments, statistical analytic methods, and ethical issues.

3.2 Research Design

The research design could be described as a set of measures taken to solve the issues raised by the research (Sekaran & Bougie, 2016). The research design for this study follows a quantitative methodology. The purpose of this design is to collect data from many participants in an efficient manner, allowing the researcher to analyze the data using statistical techniques and draw conclusions about the research question. The online questionnaire will be administered using a survey platform, allowing participants to complete the questionnaire from any location in Saudi Arabia with an internet connection. The questionnaire was intended to enable responders to skip one or more characteristic questions. However, they must answer all other research questions. The data collected from the questionnaire will be analyzed using statistical software to identify trends and

patterns in the data and the results of the study will be reported in a detailed research report in the next chapter.

3.3 Target Population, Sampling, and Research Participants

The study was carried out with the participation of several companies from the architectural industry as the population. The architectural companies are diverse in terms of the types of services they provide, ranging from design to construction. According to that, it was difficult to specify the number of architectural companies that active in Saudi Arabia.

However, a sample of participants that was representative of the whole was needed to be chosen for the research. It is common practice to choose subsets or segments of a population and then use them as a proxy for the whole population in a statistical study (Bell & Bryman, 2015). There are two different sorts of sampling processes, and they are probability sampling and non-probability sampling.

The practice of picking a subset of a population by using random methods while maintaining a high level of confidence is known as probability sampling. Methods of sampling that are not based on probability do not have a fixed or predictable likelihood of picking anybody (Sekaran & Bougie, 2016). Because of the difficulties presented by a geographical, non-probability convenient sampling was used. By using this strategy, the researcher got useful information in a relatively short period of time.

Given that it is difficult to estimate the population size, the researcher in this study depends on the advice of the previous research scientists. It is generally recommended to have a sample size of at least 50 for regression analysis (Cohen et al., 2003). A few rules of thumb can be used to determine an appropriate sample size for a study. One such rule is the "10:1" rule, which suggests that the sample size should be at least 10 times the number of variables being studied (Hair et al., 2010). This means that to study 4 variables and sub-variables, a sample size of at least 400 would be recommended.

3.4 Data Collection Procedure

An online questionnaire that workers had to fill out was used. The researcher has provided a concise presentation over the phone to the firms on the goal of the study, the significance of the findings, and the technique for data collection in the sequence in which it will take place. The researcher did a secondary check by personally checking over all the completed questionnaires that were handed in. The components of the questionnaire were governed by conditions, one of which required the respondent to answer each questionnaire item before moving on to the next one, but not the companies' characteristic questions. This ensured that the operation did not leave any missing data.

3.5 Data Collection Instruments

The following measuring tools were used in the study process to measure the constructs that were being investigated:

3.5.1 Virtual Reality

The researcher crafted questions by scrutinizing a plethora of studies that had hitherto assessed the Virtual Reality variable. Through an analysis of antecedent research and scholarly literature, the principal constituents of the Virtual Reality variable were discerned.

This investigation encompassed a comprehensive review of antecedent research on virtual reality, with a specific focus on methodologies employed and approaches undertaken to gauge and delve into this technology. A considerable portion of these studies concentrated on assessing the level of virtual reality adoption and its correlation with other factors. This pattern is evident in inquiries conducted by (Lee et al., 2019; Ball et al.,2021; Delgado et al., 2020; Ghobadi & Sepasgozar, 2020).

In this study, reliance was placed upon the work of (Delgado et al., 2020) through the adoption of their research questionnaire tailored to measure virtual reality adoption. Their

methodology closely resonated with the research objectives, rendering it particularly apt for this study. Consequently, the decision was made to incorporate their research questionnaire as a guiding framework for investigating virtual reality. This judicious choice facilitated the coherent and systematic structure of the study, thereby augmenting its robustness and reliability.

The scale measures four distinct components that collectively constitute the level of virtual reality adoption. Enhancing performance constitutes the first component, comprising eight questions. The second component pertains to improving the company's image, which is delineated by five questions. The final two components, enhancing the company's overall performance and bolstering research and development, are constructed from five and three questions, respectively.

3.5.2 Marketing Mix

Parallel to the scrutiny directed toward virtual reality, the researcher explored the marketing mix variable. This variable has been a subject of extensive inquiry across diverse sectors, including but not limited to education, commerce, industry, and construction. As such, the researcher opted to narrow the literature review's focus to encompass studies within the realm of architecture and construction, recognizing the profound interrelation between these domains.

Within this curated literature landscape, the researcher discerned the work of (Al-Fadly A., 2019) as a notable and authoritative exploration of the marketing mix variable within the specific context of contracting and construction. This study, characterized by its reliability and contemporaneity, offered invaluable insights pertinent to the research at hand.

In leveraging Al-Fadly's research as a foundational pillar, the researcher adapted Al-Fadly's marketing mix questionnaire to harmonize with the framework of this research. While ensuring fidelity to the substantive essence of the questions, slight modifications were made to the question formulations to better align with the context and objectives of this research endeavor.

The questionnaire is structured from 50 questions, categorized according to the various components of the marketing mix. Specifically, the product component comprises 14 questions, while the distribution activities section is delineated by 7 questions. The pricing component encompasses 16 questions, and the promotion component is represented by 13 questions. This meticulous division ensures comprehensive coverage of the diverse facets comprising the marketing mix, facilitating a nuanced exploration of each component's role and impact within the overarching framework of marketing strategy.

3.6 Validity Test

The validity of a measuring instrument may be evaluated according to how accurately it predicts the constructs that are pertinent to the inquiry (Schindler & Cooper, 2003). In this study, we considered both the face validity and the content validity. To ensure the construct validity of the questionnaire, it was divided into sections, each of which was developed to measure a distinct aspect of the overall construct and to have strong correlations with the corresponding sub-constructs described in the conceptual framework of the research. In addition to this, the questionnaire was subjected to the scrutiny of five associate professors or academic doctors specializing in the domains of business and management.

3.7 Reliability Test

The relevance of the survey's measuring questions is evaluated about reliability using the test (Cronbach, 1951). The trustworthiness of the results may be determined by their consistency as well as their accuracy. A reliable instrument will provide findings that are similar when the same examination is performed several times on a comparable sample of respondents in the same environment (Cohen et al. 2003).

Because there was no ambiguity in the questions and there were no leading questions, the dependability of the research instrument was not compromised in any way. Cronbach's

alpha was used to the data in the surveys in order to evaluate their level of consistency. Dependability standards allow for a coefficient of 0.7, which falls within the acceptable range; nevertheless, a value of 0.8 or above denotes great dependability (Castillo, 2009; as cited in AONDO, 2020).

3.8 Statistical Analysis

This section provides an overview of the statistical approaches that were used in the research and classifies those approaches by the sequence in which they were employed. Quantitative data was collected via the use of online self-reported questionnaires that have a high degree of scientific validity and reliability. After performing an initial analysis to locate missing data, the dataset was then subjected to the method of multiple imputation before being aggregated. After that, diagnostic tests including reliability, descriptive, correlation, and linear regression, were implemented.

SPSS version 25 was used to analyze the quantitative data collected for the study. All the surveys that were submitted were used as references, and the elements on the questionnaire were coded to facilitate data entry. Descriptive statistics such as percentages, frequencies, the mean, and standard deviation were used in the preparation of the data and information that was then presented in tables and graphs. The use of descriptive statistics allowed for the facilitation of a more in-depth overview of the findings of the investigation.

In addressing the research question, a methodological framework incorporating reliability analysis, parametric assumption tests, and simple regression was employed to investigate the relationship between variables of interest. This multifaceted approach aimed to elucidate the underlying factors influencing the phenomenon under examination.

Firstly, reliability analysis was conducted to assess the internal consistency of the measurement scales employed within the study. This involved calculating reliability coefficients “Cronbach's alpha”, to gauge the reliability and stability of the constructs

being measured. By ensuring the robustness of the measurement instruments, the reliability analysis enhanced the validity of subsequent analyses.

Following the reliability assessment, parametric assumption tests were employed to evaluate the suitability of the data for parametric analyses, particularly regression (Ader et al. 2011). These tests scrutinized assumptions such as normality, linearity, and homoscedasticity. By confirming adherence to these assumptions, the parametric tests laid the groundwork for valid and reliable regression analyses.

Subsequently, simple regression analysis was utilized to explore the relationship between the independent and dependent variables of interest and to answer the research hypothesis. This statistical technique allowed for the examination of how changes in one variable (independent) were associated with changes in another variable (dependent) (Babbie, 2010). Through the interpretation of regression coefficients, insights into the strength and directionality of these relationships were garnered.

3.9 Missing Values

It is common for essential information to be missing in various types of research. Multiple imputation, as described by Donders et al. (2006), is an advanced technique for addressing these data gaps. This method involves estimating the missing values of a variable based on the mean of its distribution. However, as noted previously in Section 3.4, researchers prevented missing data by employing online questionnaires with mandatory response options, ensuring that no values are left unreported.

3.10 Ethical Considerations

Each participating company in the research was informed of their voluntary participation status, signifying their freedom to decline involvement. Furthermore, before granting consent for data collection, participants were provided with a clear understanding of the

study's objectives. To ensure confidentiality, only limited information pertaining to their businesses was solicited, safeguarding their identities. Additionally, participants were assured that individual results would remain confidential, with only aggregated data being disseminated to maintain anonymity. Following data collection, no alterations were made to the information gathered.

This research adhered to the ethical principle of beneficence, prioritizing the maximization of benefits while minimizing potential harm. This approach was aimed at ensuring that any adverse effects stemming from the research did not outweigh the anticipated benefits. The study's conceptualization and execution were deemed competent, underscoring its adherence to ethical guidelines. Moreover, the study placed a strong emphasis on minimizing harm to participants, with its overarching aim being the enhancement and advancement of the human condition.

CHAPTER FOUR: ANALYSES AND RESULTS

4.1 Introduction

The section discusses and explains the findings of the study, which were found through diverse analytical methods such as descriptive statistics, reliability assessments, parametric data assumption tests, and simple linear regression analyses. Furthermore, the chapter concludes with an examination of the hypotheses.

4.2 Descriptive Statistics

Descriptive statistics serve as a powerful tool for presenting quantitative information in a format that is easily comprehensible. By employing descriptive statistics, large datasets can be condensed and interpreted more effectively. One fundamental aspect of descriptive statistics is the concept of distribution, which entails describing the frequency of specific values or ranges of values for a variable. This involves listing each possible value of a variable alongside the corresponding number of occurrences.

Frequency distribution is commonly used to describe a single variable, where each data value may be represented individually or organized into categories beforehand. Both tables and graphs can be utilized to illustrate frequency distributions, providing visual aids for better understanding.

Central tendency, another important aspect of descriptive statistics, offers an estimate of the "center" of a distribution. This includes measures such as the mean (average), median,

and mode. The mean is perhaps the most frequently used measure of central tendency, representing the average value of the distribution.

Dispersion, on the other hand, refers to the spread of values around the central tendency. Measures commonly used to analyze dispersion include the range and standard deviation. The range is calculated by subtracting the lowest value from the highest value. However, due to the influence of outliers, the standard deviation provides a more precise estimate of dispersion. It illustrates how scores within a dataset deviate from the overall average, offering insights into the variability of the data.

The researcher gathered 423 valid responses from the intended population (employees in the architectural industry in Saudi Arabia). This chapter delineates both categorical (demographic) and continuous variables and evaluates certain assumptions preceding the application of correlation and simple regression analyses. Descriptive statistics, encompassing frequencies, mean, and standard deviation, were utilized. Additionally, parametric data tests were conducted to validate the data and confirm the assumptions for regression analysis.

4.2.1 Categorical (Demographic) Variables

Demographic data encompass background details concerning the study's participants, including gender, age, educational attainment, position level, and professional experience. The subsequent sections thoroughly examine all categorical variables, employing frequency analysis for each.

4.2.1.1 Gender

The data presented in Table 1 illustrates the gender distribution among the study's participants. The total sample comprises 423 individuals, of which 309 are male and 114 are female.

Table 1: Frequencies for gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	309	73.0	73.0	73.0
	Female	114	27.0	27.0	100.0
	Total	423	100.0	100.0	

Males constitute 73.0% of the sample, while females represent 27.0%. These percentages reflect both the valid and cumulative proportions of the sample. Specifically, the cumulative percentage indicates that males account for the first 73.0% of the sample, with the remaining 27.0% being females. This disparity in gender distribution highlights a significantly higher representation of males compared to females within the study sample.

4.2.1.2 Age

Analysis of age distribution reveals varying representation across different age groups. Table 2 provides an overview of the age distribution among the 423 participants. Among these respondents, various age groups are represented.

Table 2: Frequencies for Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 25 years old	64	15.1	15.1	15.1
	25 to less than 35 years old	62	14.7	14.7	29.8
	35 to less than 45 years old	71	16.8	16.8	46.6
	45 to less than 55 years old	90	21.3	21.3	67.8
	55 to less than 65 years old	78	18.4	18.4	86.3
	65 years old or more	58	13.7	13.7	100.0
	Total	423	100.0	100.0	

Individuals aged less than 25 years old constitute 15.1% of the sample, with 64 respondents falling into this category. The age group of 25 to less than 35 years old encompasses 62 individuals, representing 14.7% of the total sample. Participants aged 35 to less than 45 years old make up 16.8% of the sample, with 71 individuals falling into this category. The age bracket of 45 to less than 55 years old includes 90 respondents, constituting 21.3% of the total sample. Additionally, the age group of 55 to less than 65 years old encompasses 78 individuals, representing 18.4% of the sample. Lastly, respondents aged 65 years old or more account for 13.7% of the sample, with 58 individuals in this category. The cumulative percentages demonstrate the increasing distribution of respondents across successive age categories, culminating in 100.0% with the final age group.

4.2.1.3 Educational Level

Table 3 presents the distribution of educational levels among the 423 participants. The data reveals several educational categories within the sample:

Table 3: Frequencies for Educational Level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High school degree	5	1.2	1.2	1.2
	University degree	401	94.8	94.8	96.0
	Masters' degree	15	3.5	3.5	99.5
	PhD degree	2	.5	.5	100.0
	Total	423	100.0	100.0	

Among the respondents, 5 individuals possess a high school degree, representing 1.2% of the total sample. A significant majority, accounting for 94.8% of the sample, hold a university degree, with 401 respondents falling into this category. Additionally, 15 individuals, constituting 3.5% of the sample, have obtained a master's degree. A smaller

proportion of respondents, specifically 2 individuals (0.5% of the sample), hold a PhD degree. The cumulative percentages depict the progressive distribution of respondents across educational levels, culminating at 100.0% with the attainment of a PhD degree.

4.2.1.4 Years of Experience in the Architecture Industry

Table 4 provides an insight into the distribution of years of experience within the architecture industry among the 423 participants. The data indicates a diverse range of experience levels: of years of experience in the architecture industry demonstrates a diverse distribution among respondents.

Table 4: Years of Experience in the Architecture Industry

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than four years	69	16.3	16.3	16.3
	Four to less than eight years	63	14.9	14.9	31.2
	Eight to less than twelve years	78	18.4	18.4	49.6
	Twelve to less than sixteen years	70	16.5	16.5	66.2
	Sixteen to less than twenty years	67	15.8	15.8	82.0
	Twenty years or more	76	18.0	18.0	100.0
	Total	423	100.0	100.0	

Among the respondents, 69 individuals (16.3% of the sample) have less than four years of experience in the architecture industry. A comparable proportion, comprising 63 individuals (14.9% of the sample), possess between four to less than eight years of experience. Furthermore, 78 respondents (18.4% of the sample) have accumulated between eight to less than twelve years of experience. Similarly, 70 individuals (16.5% of

the sample) report having twelve to less than sixteen years of experience. Moreover, 67 respondents (15.8% of the sample) have acquired sixteen to less than twenty years of experience. Lastly, 76 individuals (18.0% of the sample) boast twenty years or more of experience in the architecture industry. The cumulative percentages depict the gradual accumulation of experience levels among respondents, reaching 100.0% with individuals reporting twenty years or more of experience.

4.2.1.5 Years of Experience in Respondents' Current Companies

Table 5 delineates the distribution of years of experience within the current company among the 423 participants.

Table 5: Years of Experience in Current Company

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than four years	78	18.4	18.4	18.4
	Four to less than eight years	55	13.0	13.0	31.4
	Eight to less than twelve years	76	18.0	18.0	49.4
	Twelve to less than sixteen years	72	17.0	17.0	66.4
	Sixteen to less than twenty years	69	16.3	16.3	82.7
	Twenty years or more	73	17.3	17.3	100.0
	Total	423	100.0	100.0	

The data portrays a range of experience levels: distribution of years of experience in respondents' current companies also exhibits variability. In Table 5, the largest proportion, accounting for 17.3% (n = 73) of the sample, reports having sixteen to less than twenty years of experience in their current roles. Conversely, 18.4% (n = 78) of respondents have

less than four years of experience, suggesting a notable turnover rate or influx of new hires within architectural organizations.

4.2.1.6 Managerial Level

Managerial-level distribution underscores the hierarchical structure prevalent within architectural firms. In Table 6, the majority of respondents hold positions at the top management level (27.0%, n = 114), followed by the front-line management level (26.5%, n = 112), middle management level (25.3%, n = 107), and senior management level (21.3%, n = 90).

Table 6: Managerial Level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Top Management level	114	27.0	27.0	27.0
	senior management level	90	21.3	21.3	48.2
	middle management level	107	25.3	25.3	73.5
	front-line management level	112	26.5	26.5	100.0
	Total	423	100.0	100.0	

4.2.1.7 Company Role Within the Architectural Industry

Analysis of company roles within the architectural industry reveals a diverse spectrum of professional functions among respondents. Table 7 shows architects constitute the largest segment, comprising 40.4% (n = 171) of the sample, followed by marketers (23.4%, n = 99), contractors (23.6%, n = 100), and client/end users (8.0%, n = 34).

Table 7: Company Role in the Architectural Industry

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Architect	171	40.4	40.4	40.4
	Marketer	99	23.4	23.4	63.8
	Contractor	100	23.6	23.6	87.5
	Client/End User	34	8.0	8.0	95.5
	Other	19	4.5	4.5	100.0
	Total	423	100.0	100.0	

4.2.1.8 Respondent's Years of Experience in The Architectural Industry

Examination of years of experience in the architectural industry highlights varying levels of expertise among respondents. As shown in Table 8, while a significant proportion reports less than 1 year of experience (22.0%, n = 93), an equally substantial contingent has 15 years or more of experience (21.3%, n = 90), indicating a diverse range of career stages within the profession.

Table 8: Years of experience in the Architectural Industry

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 1 year	93	22.0	22.0	22.0
	From 1 year and less than 5 years	80	18.9	18.9	40.9
	From 5 years and less than 10 years	87	20.6	20.6	61.5
	From 10 years and less than 15 years	73	17.3	17.3	78.7
	15 years or more	90	21.3	21.3	100.0
	Total	423	100.0	100.0	

4.2.1.9 Company Size

Table 9 shows that the distribution of company size reveals a majority of respondents working in smaller firms with less than 10 employees, comprising 37.4% (n = 158) of the sample. Conversely, 29.8% (n = 126) of respondents are employed in companies with 10 to less than 50 employees, while 32.9% (n = 139) work in larger firms with 50 employees or more.

Table 9: Company Size

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 10 employees	158	37.4	37.4	37.4
	From 10 and less than 50 employees	126	29.8	29.8	67.1
	50 employees or more	139	32.9	32.9	100.0
	Total	423	100.0	100.0	

4.2.1.10 Virtual Reality Adoption Level

Lastly, Table 10 delineates the varying levels of adoption of virtual reality (VR) technology within the architectural sector.

Table 10: Virtual Reality Adoption Level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not adopted	87	20.6	20.6	20.6
	Pre-design Phase	91	21.5	21.5	42.1
	Schematic Design	71	16.8	16.8	58.9
	Design Development	93	22.0	22.0	80.9
	Construction Documents	81	19.1	19.1	100.0
	Total	423	100.0	100.0	

Of the 423 respondents surveyed, 20.6% (n = 87) have not yet adopted VR technology, indicating a significant portion of the sample remains outside the VR paradigm. Conversely, a considerable segment, representing 21.5% (n = 91) of respondents, are in the pre-design phase, signaling an active interest or consideration towards integrating VR into their workflow.

Moving into the schematic design phase, 16.8% (n = 71) of respondents are actively employing VR technology, suggesting a growing acceptance of its utility during this conceptualization stage. This trend continues as design progresses, with 22.0% (n = 93) utilizing VR during the design development phase.

The peak of VR adoption appears during the construction documents phase, where 19.1% (n = 81) of respondents are leveraging VR technology, indicating its perceived value in the finalization of project details.

4.2.2 Categorical (Demographic) Variables

The descriptive statistics presented in Table 11 provide insights into various continuous variables, including virtual reality drivers and the four variables of the marketing mix 4Ps (Product, Price, Promotion, and Distribution). Continuous variables were characterized using the mean to determine the central tendency of the dataset and standard deviation to examine the dispersion for each variable.

For VR adoption drivers, the mean score among respondents stands at 62.64, with a standard deviation of 13.401, indicating a moderate level of agreement regarding the significance of these drivers. The variance, calculated at 179.576, suggests some degree of dispersion in responses, highlighting differing perspectives among participants.

Product activities, encompassing aspects related to the development and design of VR applications, exhibit a lower mean score of 41.46, with a standard deviation of 10.484. This indicates a less uniform consensus among respondents regarding the importance of

these activities in facilitating VR adoption within the architectural domain. The variance of 109.913 further supports the notion of varied viewpoints among participants.

Distribution activities, which pertain to the dissemination and accessibility of VR technologies, demonstrate a mean score of 20.51, with a standard deviation of 5.041. This suggests a relatively lower emphasis placed on distribution activities compared to other factors influencing VR adoption. The variance of 25.412 indicates limited dispersion in responses regarding this aspect.

Table 11: Descriptive Statistics of Research Variables

Descriptive Statistics						
	N	Minimum	Maximum	Mean	Std. Deviation	Variance
VR Adoption Drivers	423	22	103	62.64	13.401	179.576
Product Activities	423	13	77	41.46	10.484	109.913
Distribution Activities	423	6	36	20.51	5.041	25.412
Pricing Activities	423	13	79	47.56	11.602	134.617
Promotion Activities	423	11	72	38.82	9.407	88.483
Valid N (listwise)	423					

Regarding pricing activities, which involve strategies related to the cost and affordability of VR solutions, the mean score is 47.56, with a standard deviation of 11.602. This suggests a moderate level of agreement among respondents regarding the importance of pricing strategies in driving VR adoption within the architectural industry. The variance of 134.617 indicates some degree of variability in responses concerning pricing activities.

Lastly, promotion activities, encompassing marketing and promotional efforts to enhance awareness and acceptance of VR technology, exhibit a mean score of 38.82, with a standard deviation of 9.407. This suggests a moderate level of agreement among respondents regarding the significance of promotional activities in facilitating VR

adoption. The variance of 88.483 indicates some variability in responses regarding the effectiveness of promotional strategies.

Overall, these descriptive statistics provide a nuanced understanding of the factors influencing VR adoption within the architectural sector, shedding light on the varying degrees of importance attributed to different facets of VR adoption drivers and activities.

Furthermore, to enhance the utility of demographic variables in the research, a chi-square test of independence was employed. This test is optimal for examining the association between categorical variables. In examining the factors influencing the adoption level of virtual reality in the architecture industry, a series of chi-square tests were conducted to determine the relationship between various categorical variables and the level of VR adoption. The variables analyzed included years of experience in the architecture industry, years of experience in the current company, managerial level, company role in the architectural industry, and company size.

Table 12 examines the relationship between the years of experience professionals have in the architecture industry and their level of VR adoption.

Table 12: Years of Experience in the Architecture Industry * Virtual Reality Adoption Level

Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	16.252a	20
Likelihood Ratio	16.120	20
Linear-by-Linear Association	0.754	1
N of Valid Cases	423	
a 0 cells (0.0%) have expected count less than 5. The minimum expected count is 10.57.		

The results indicate that there is no significant association between years of experience in the architecture industry and VR adoption level, as evidenced by the Pearson Chi-Square p-value of 0.701, which is well above the 0.05 significance threshold.

Table 13 explores whether the number of years spent in the current company influences the level of VR adoption.

Table 13: Years of Experience in Current Company * Virtual Reality Adoption Level

Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	21.228a	20
Likelihood Ratio	21.931	20
Linear-by-Linear Association	0.068	1
N of Valid Cases	423	
a 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.23.		

The analysis shows no significant association between years of experience in the current company and VR adoption level, with a Pearson Chi-Square p-value of 0.384, indicating that tenure in the current company does not significantly affect VR adoption.

Table 14 assesses the relationship between managerial level and the adoption of VR technology.

Table 14: Managerial Level * Virtual Reality Adoption Level

Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	8.826a	12
Likelihood Ratio	9.096	12
Linear-by-Linear Association	0.152	1
N of Valid Cases	423	
a 0 cells (0.0%) have expected count less than 5. The minimum expected count is 15.11.		

The results show no significant relationship between managerial level and VR adoption, as indicated by the Pearson Chi-Square p-value of 0.718, suggesting that managerial level does not play a significant role in the adoption of VR.

Table 15 examines whether the specific role of a company within the architectural industry impacts the adoption of VR technology.

Table 15: Company Role in the Architectural Industry * Virtual Reality Adoption Level

Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	15.501a	16
Likelihood Ratio	15.649	16
Linear-by-Linear Association	3.080	1
N of Valid Cases	423	
a 5 cells (20.0%) have expected count less than 5. The minimum expected count is 3.19.		

The chi-square test reveals no significant association between company role and VR adoption, with a Pearson Chi-Square p-value of 0.488. This implies that the role a company plays in the architectural industry does not significantly influence its level of VR adoption.

Table 16 investigates a second instance of the relationship between years of experience in the architecture industry and VR adoption level, likely with different categorical groupings.

Table 16: Company Role in the Architectural Industry * Virtual Reality Adoption Level

Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.966a	16
Likelihood Ratio	8.160	16
Linear-by-Linear Association	0.048	1
N of Valid Cases	423	
a 0 cells (0.0%) have expected count less than 5. The minimum expected count is 12.25.		

The results again indicate no significant association between years of experience in the architecture industry and VR adoption level, with a Pearson Chi-Square p-value of 0.950, further confirming that experience does not significantly impact VR adoption.

Lastly, Table 17 analyzes whether the size of a company is associated with its level of VR adoption.

Table 17: Company Size * Virtual Reality Adoption Level

Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.822a	8
Likelihood Ratio	6.699	8
Linear-by-Linear Association	0.301	1
N of Valid Cases	423	
a 0 cells (0.0%) have expected count less than 5. The minimum expected count is 21.15.		

The chi-square test indicates no significant association between company size and VR adoption, with a Pearson Chi-Square p-value of 0.556. This suggests that the size of a company does not have a significant impact on its adoption of VR technology.

The chi-square tests presented in these tables showed that no statistically significant association between the analyzed categorical variables analyzed (years of experience in the architecture industry, years of experience in the current company, managerial level, company role, and company size) and the level of VR adoption in the companies.

4.3 Reliability Analysis

Reliability denotes the degree to which a scale yields consistent outcomes when measurements are replicated multiple times. The process of evaluating reliability is known as reliability analysis. This analysis entails assessing the extent of systematic variation within a scale by examining the correlation between scores obtained from various administrations of the scale. Within reliability analysis, internal consistency serves as a metric to evaluate the reliability of a summated scale, where multiple items are combined to generate a total score. This facet of reliability analysis emphasizes the internal coherence among the items comprising the scale (Hair et al., 2010).

Table 18 indicates that Cronbach's alpha values for all scales exceeded 0.7, meeting the criterion for good reliability.

Table 18: Reliability Statistics

Variable	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Virtual Reality Drivers	.824	.823	21
Product	.750	.759	14
Price	.721	.722	16
Promotion	.805	.801	13
Distribution	.718	.714	7

Notably, virtual reality drivers and Promotion exhibited Cronbach's alpha values surpassing 0.8, indicating exceptional reliability and comprehensibility in measurement. The remaining variables fell within the range of 0.7 to 0.8 for Cronbach's alpha, indicating good reliability for the scales (DeVellis, 2017).

4.4 Parametric Data Assumption Test

In statistical analysis, parametric tests are predicated upon certain assumptions regarding the data, which serve as fundamental characteristics. Deviation from these assumptions can significantly alter the research conclusions and the interpretation of results.

4.5 Normality Test

The normality test establishes whether the data follows a normal distribution. It is a check to see whether the data being tested conforms to a normal distribution (Avioli, 2012). As a best practice, normality should be evaluated both visually and statistically, with the Shapiro-Wilk test being the most recommended approach (Ghasemi & Zahediasl, 2012).

Table 19: Normality Shapiro-Wilk tests

Tests of Normality			
	Shapiro-Wilk		
	Statistic	df	Sig.
VR Adoption Drivers	.998	423	.823
Product Activities	.994	423	.080
Distribution Activities	.996	423	.320
Pricing Activities	.996	423	.320
Promotion Activities	.995	423	.147
a. Lilliefors Significance Correction			

The results indicate in Table 19 that for all variables the Shapiro-Wilk statistics yielded p-values greater than 0.05. This suggests no significant departure from normality, thereby supporting the assumption of normal distribution for these variables.

4.6 Missing Data and Outliers

The researcher employed an online survey distribution method to administer the questionnaire to the respondents. This approach afforded the researcher control over respondent response criteria, including the requirement for completion of all questions before submission. Such stringent criteria ensured the acquisition of comprehensive data without any omissions. Additionally, to ensure seamless data transfer to the analysis software without any missing values, the researcher coded missing data as "0" and conducted data frequency checks to ascertain the absence of any missing values.

Upon confirming the absence of missing data necessitating processing, the research proceeded to scrutinize potential outliers among the research variables using the Boxplot tool in SPSS. Boxplot for VR adoption drivers was extracted (see Fig.2)

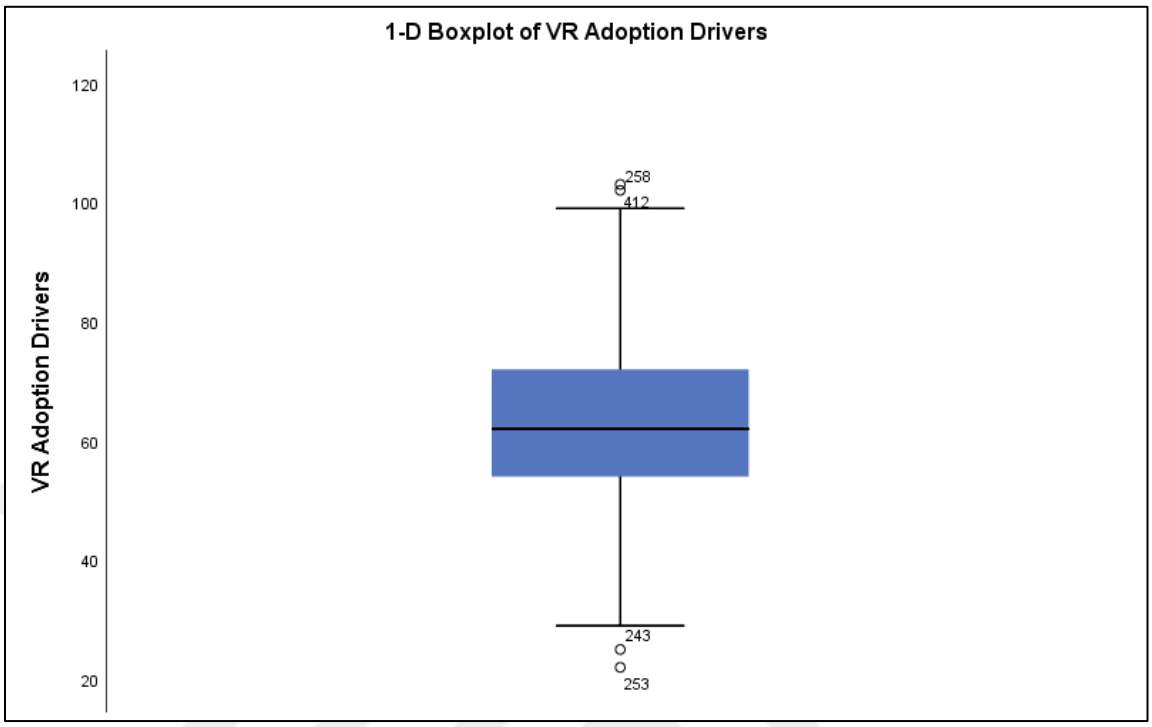

Figure 2: Boxplot of VR Variable

Examination of Fig. 2 revealed outliers in responses numbered 258, 412, 243, and 253 within the virtual reality adoption driver variable. The necessity of outlier deletion for the virtual reality adoption variable was verified using Histogram analysis (see Fig. 3).

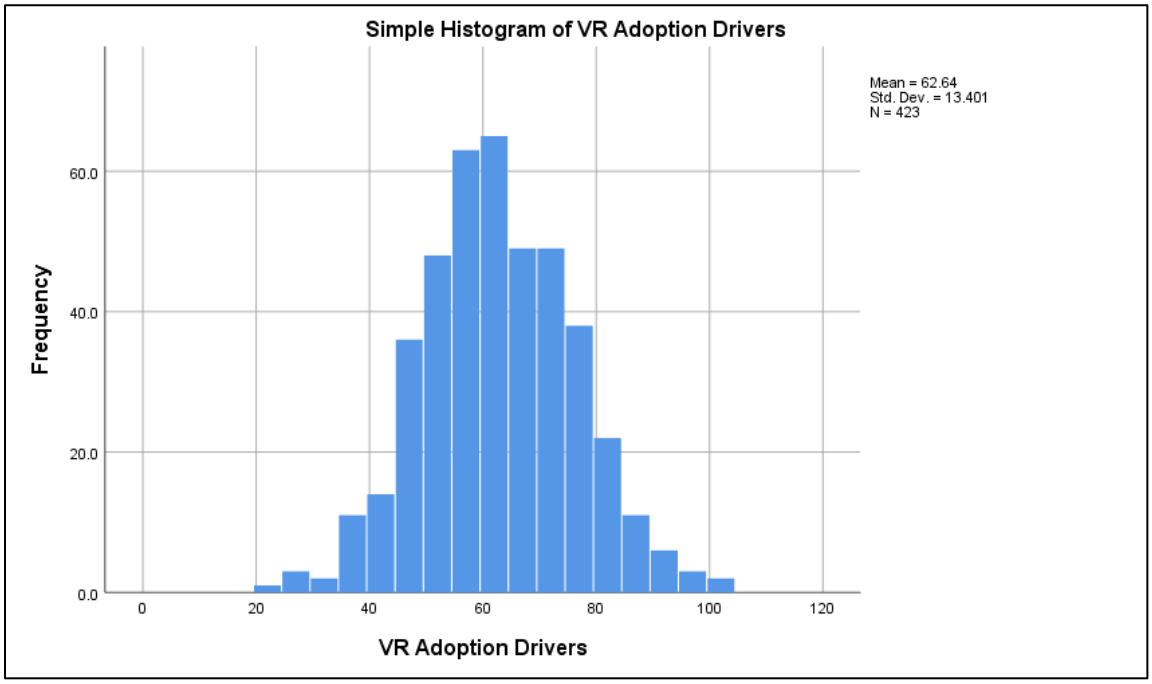

Figure 3: Histogram of VR Variable

Following a comparison of the histogram shapes with the Boxplot results, the research concluded to not exclude outliers from the virtual reality adoption variable.

Similarly, a Boxplot for the distribution variable was extracted to determine outliers (see Fig. 4).

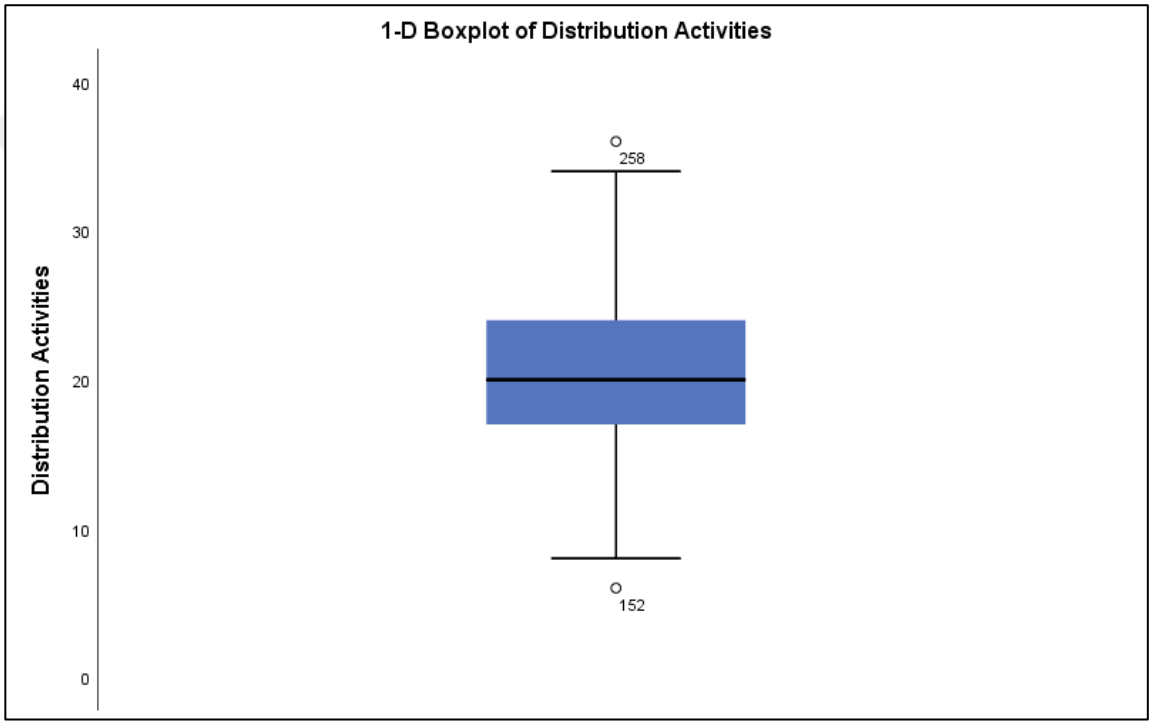

Figure 4: Boxplot of Distribution Variable

According to the boxplot figure, outliers were detected in responses numbered 258 and 152 within the distribution variable. The necessity of outlier deletion for the virtual reality adoption variable was verified using Histogram analysis (see Fig. 5).

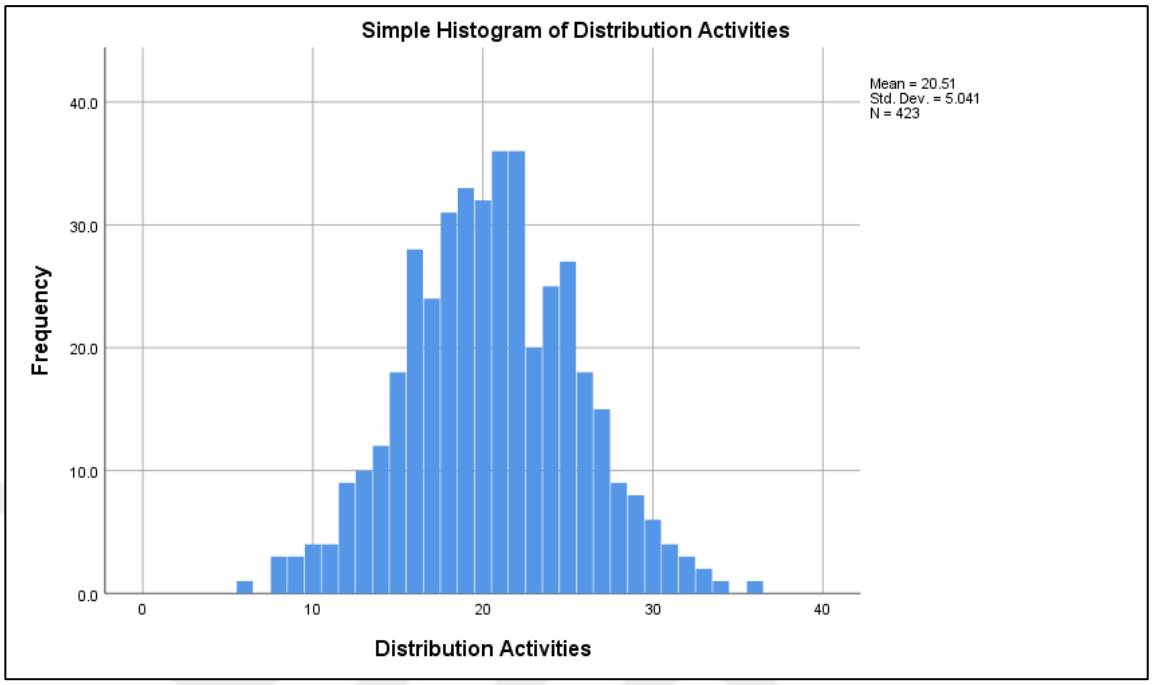

Figure 5: Histogram of Distribution Variable

Following a comparison of the histogram shapes with the Boxplot results, the research concluded to exclude outliers from the distribution variable.

Boxplot for pricing variable Figure 6 was extracted to determine outliers.

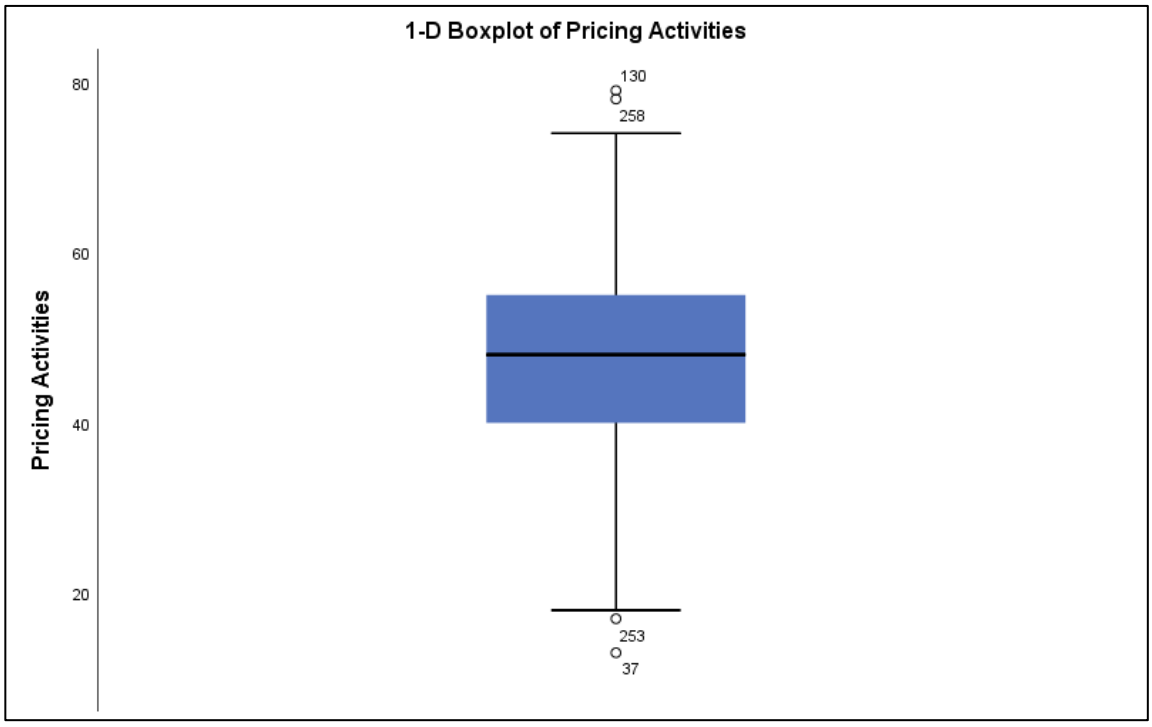

Figure 6: Boxplot of Pricing Variable

Examination of Fig. 6 revealed outliers in responses numbered 130, 258, 253, and 37 within the pricing variable. To determine the need for outlier deletion in the pricing variable, Histogram analysis was utilized for secondary verification (see Fig. 7).

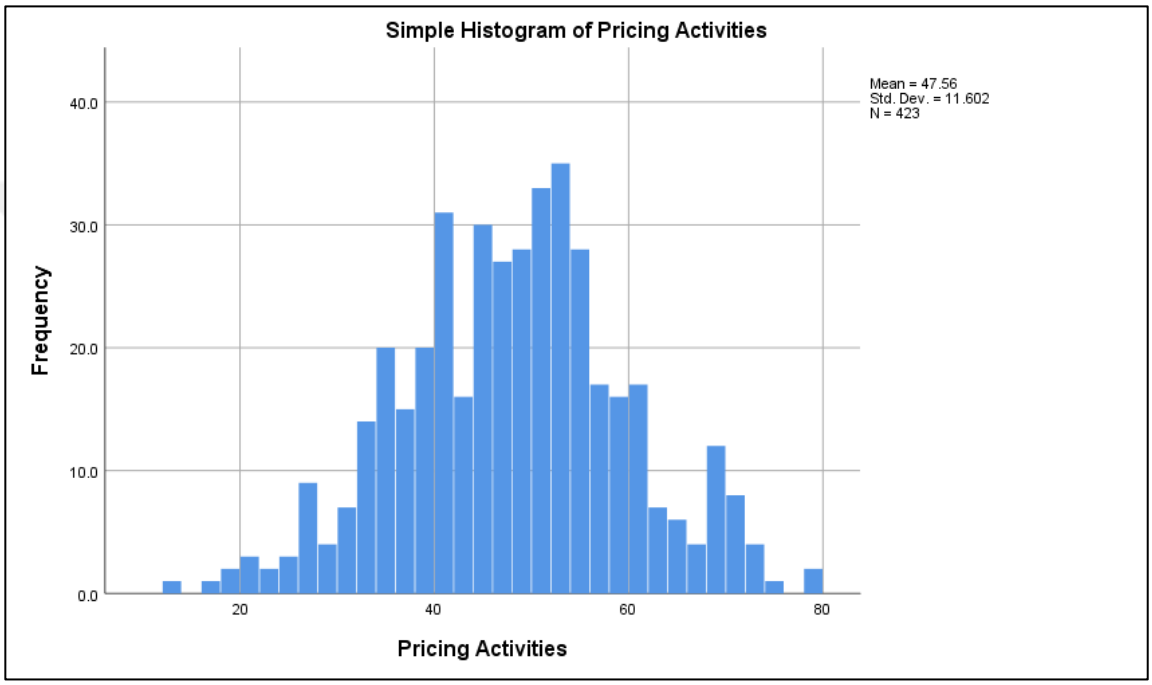

Figure 7: Histogram of Pricing Variable

Using histogram figure 7 in comparison with boxplot figure 6, the researcher conclude that outliers shall be deleted.

Similarly, Boxplot for product variables was extracted to determine outliers (see Fig. 8).

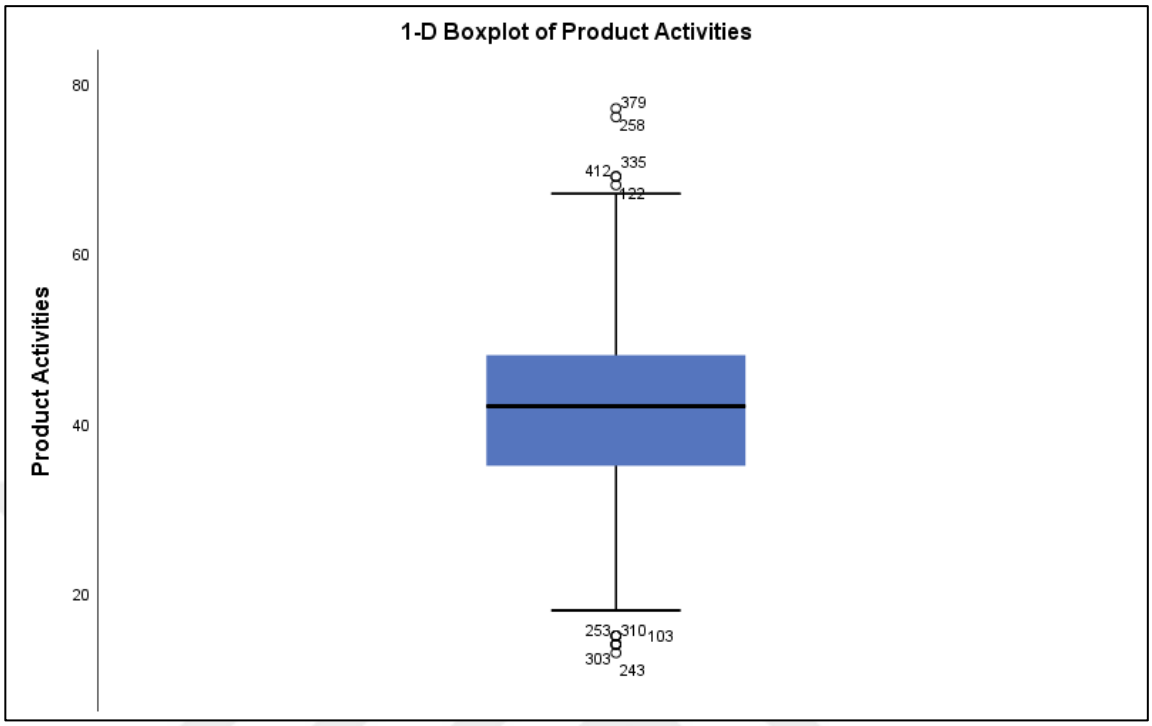

Figure 8: Boxplot of Product Variable

Examination of Fig. 8 responses numbered 379, 258, 335, 412, 122, 253, 310, 103, 303, and 243 within the product variable. Research depends on the histogram to decide whether to delete the outliers or not (see Fig. 9)

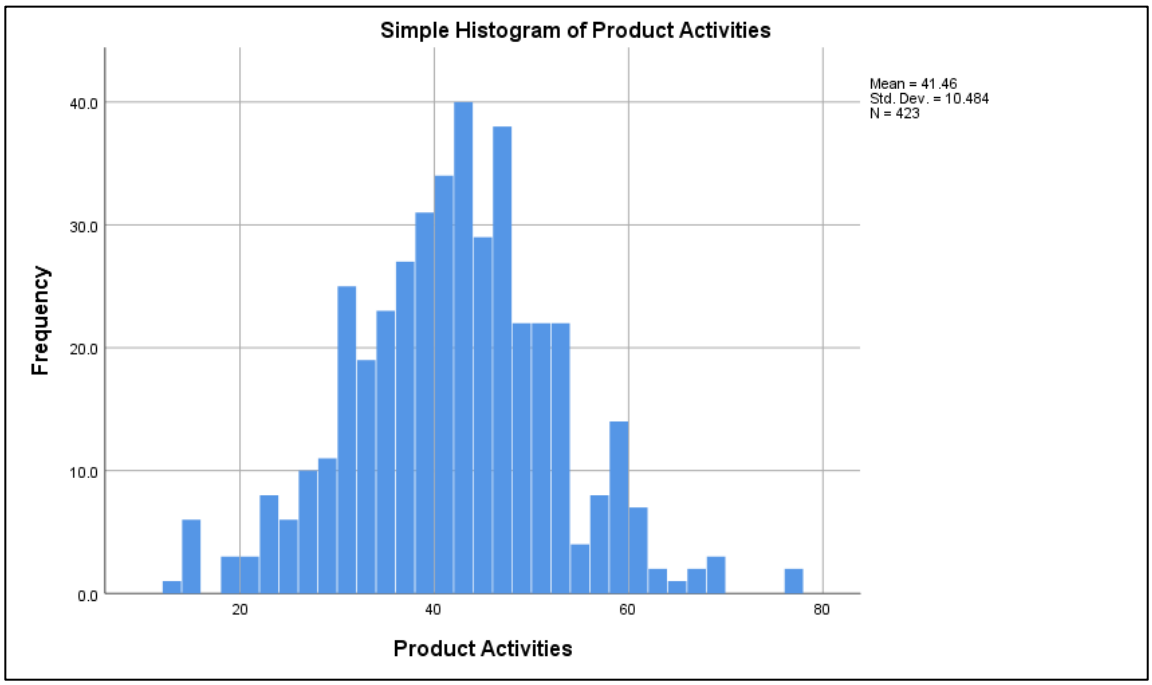

Figure 9: Histogram of Product Variable

The product variable's outlier necessity was assessed through a secondary verification using Histogram analysis (see Fig. 9). Boxplot for promotion variable Figure 10 was extracted to determine outliers.

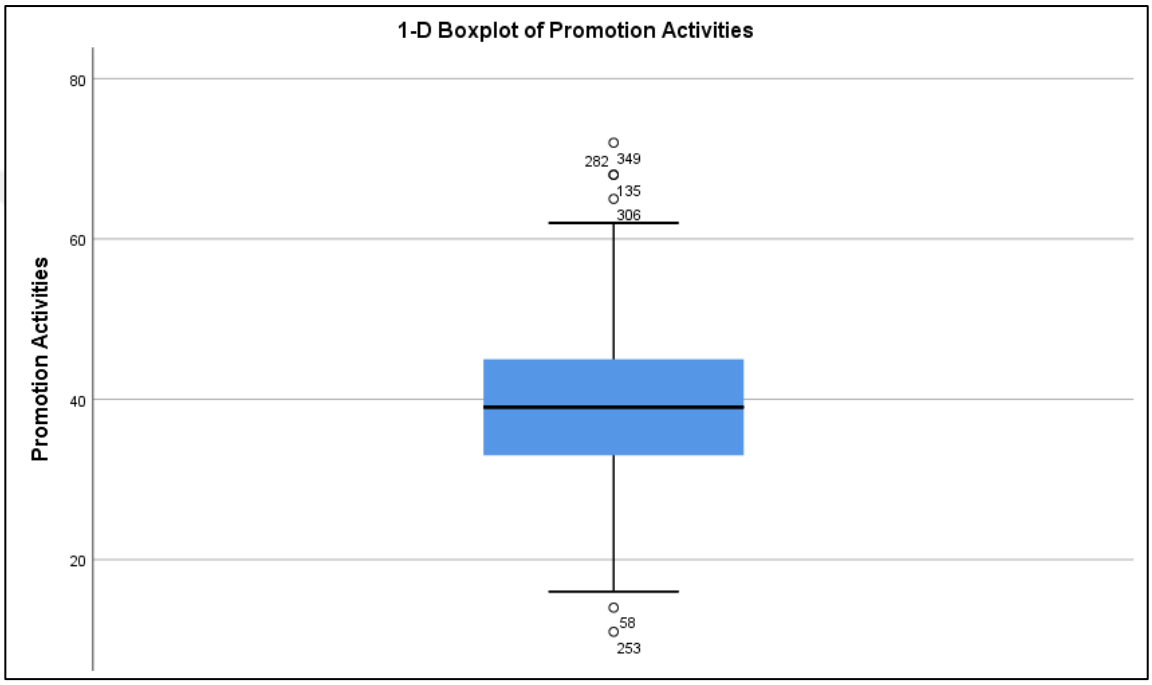

Figure 10: Boxplot of Promotion Variable

Lastly, an examination of Fig. 10 revealed outliers responses numbered 349, 282, 135, 306, 58, and 253 within the promotion variable. A histogram (see Fig. 11) was extracted to confirm outliers' deletion.

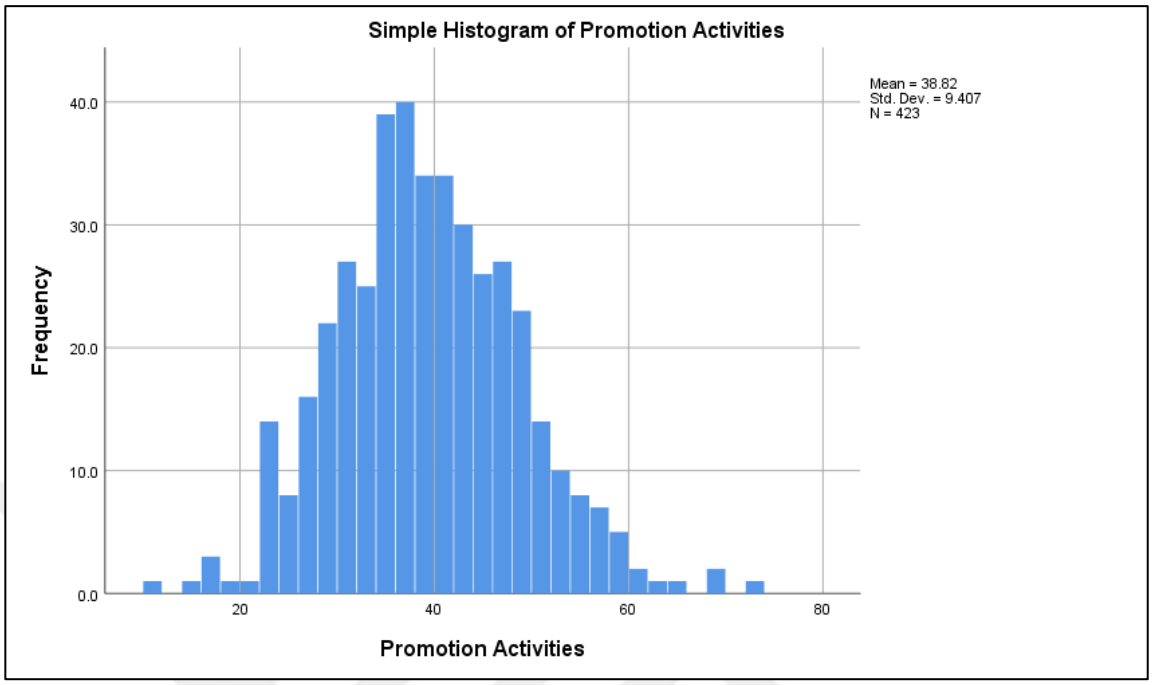

Figure 11: Histogram of Promotion Variable

Following a comparison of the histogram shapes with the Boxplot results, the research concluded to exclude outliers from the variable.

4.7 Linearity

In assessing the linearity assumption of the regression model, a Probability-Probability (P-P) plot of regression standardized residuals was constructed. The P-P plot compared the observed cumulative distribution of standardized residuals to the expected cumulative distribution under the assumption of normality.

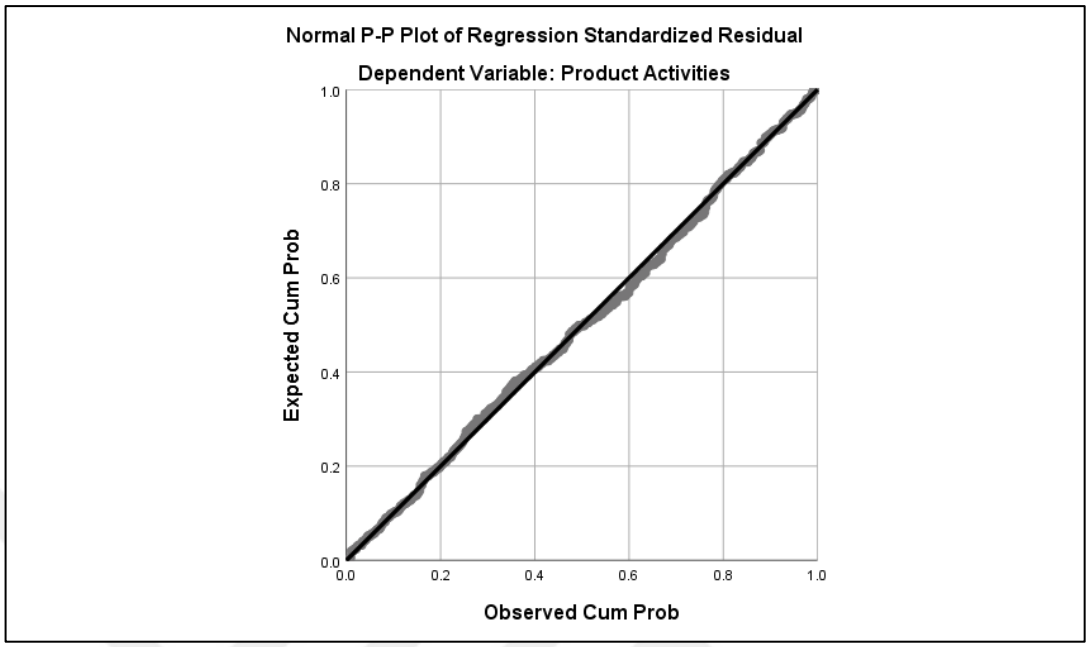

Figure 11: Normal P-P Plot of VR- Product Variables

Visual inspection of the plot for Figure 12 revealed a linear pattern closely aligned with the diagonal reference line, indicative of a strong linear relationship between the observed and expected cumulative distributions.

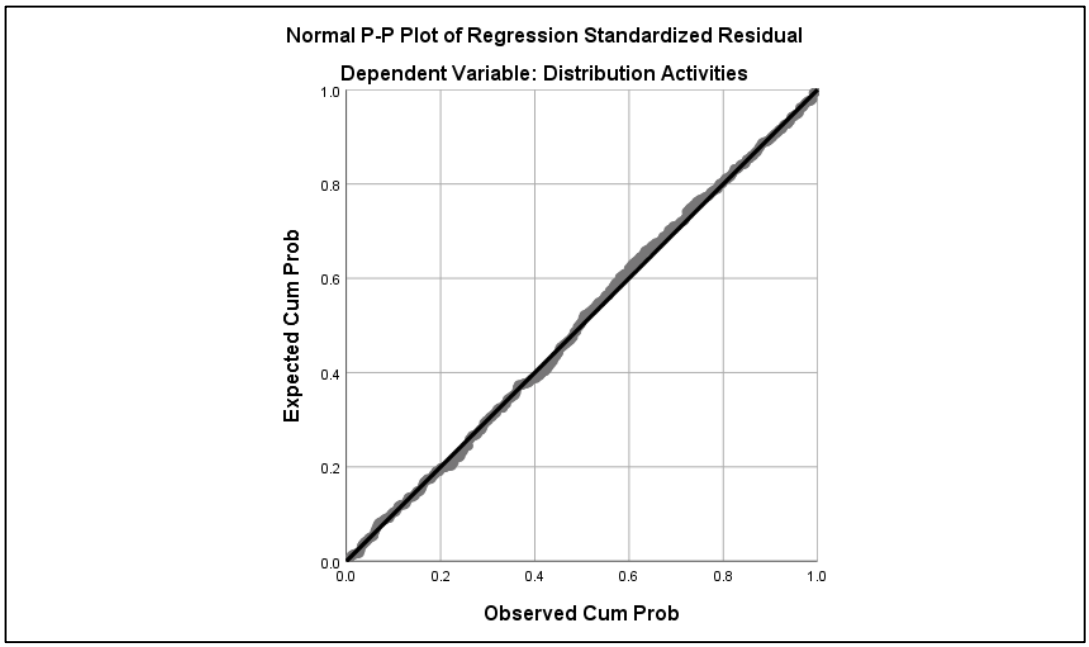

Figure 12: Normal P-P Plot of VR- Distribution Variables

Examination of the plot for Figure 13 showed a linear pattern closely following the diagonal reference line, suggesting a strong linear relationship between the observed and expected cumulative distributions.

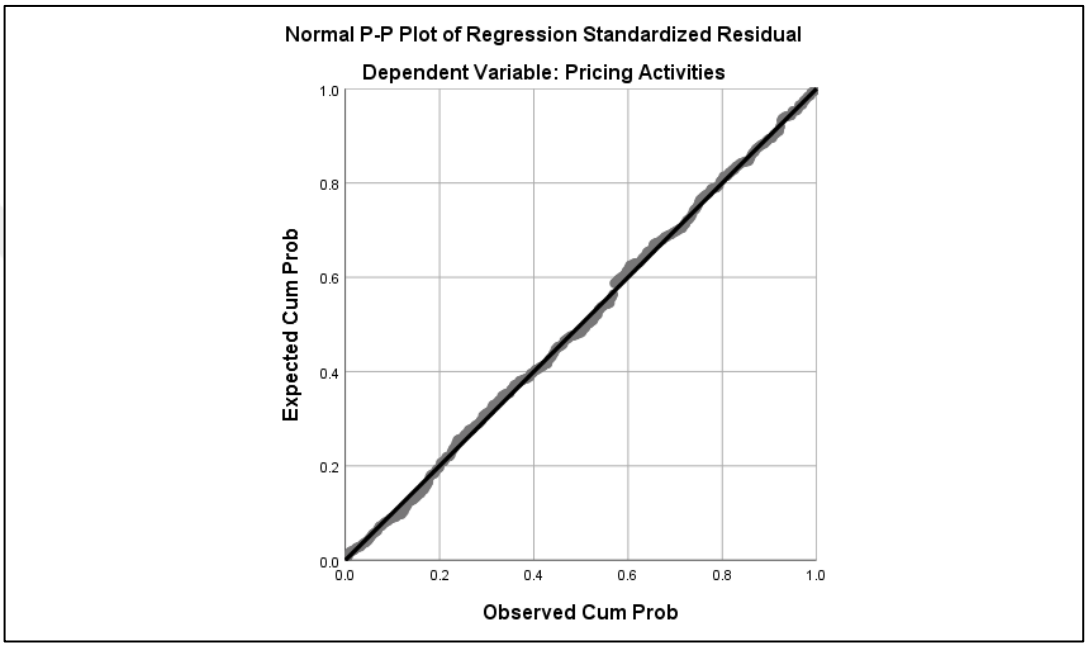

Figure 13: Normal P-P Plot of VR- Pricing Variables

Analysis of the plot for Figure 14 indicated a linear pattern that closely matched the diagonal reference line, reflecting a strong linear relationship between the observed and expected cumulative distributions.

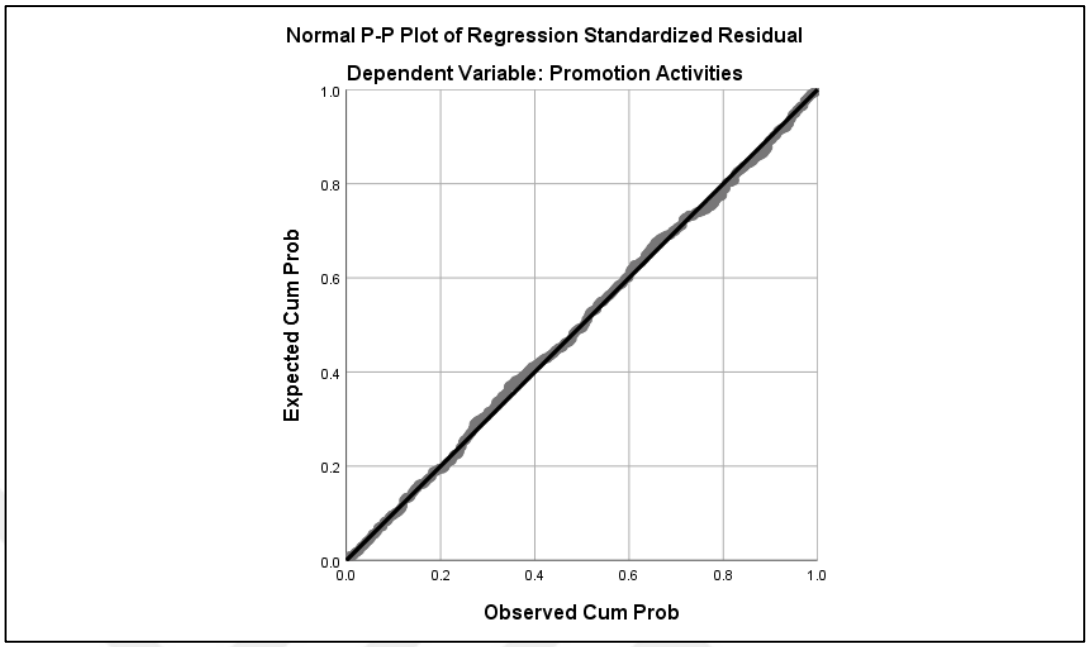

Figure 14: Normal P-P Plot of VR- Promotion Variables

Observation of the plot for Figure 15 displayed a linear pattern in close alignment with the diagonal reference line, demonstrating a strong linear relationship between the observed and expected cumulative distributions.

4.8 Homogeneity of Variances (Homoscedasticity)

Johnson and Wichern (2007) underscore the importance of assessing homoscedasticity in statistical analysis to uphold the integrity of models assuming a consistent variance of the dependent variable across all levels of independent variables. One approach to evaluating homoscedasticity involves examining the residuals of the model, which represent the disparities between observed and predicted values of the dependent variable based on the model. The Koenker test, alternatively known as the Breusch-Pagan-Godfrey test, is a statistical tool commonly employed to formally assess heteroscedasticity (Fox, 2015). This test scrutinizes the relationship between squared residuals and the predicted values of the model, comparing it against the anticipated pattern under the assumption of homoscedasticity. A significant test statistic suggests the presence of heteroscedasticity

within the model. The next table serves as an illustration of the homoscedasticity assessment for the variables.

Table 20: Test of Homoscedasticity

Variable	Koenker	
	Statistic	Sig.
Product	3.7282	.051
Distribution	.4543	.533
Pricing	.3686	.570
Promotion	2.4837	.114

Homoscedasticity assessment indicating homoscedasticity was achieved given that the significance values exceed 5%.

4.9 Simple Regression Analyses

Simple linear regression is a statistical method employed to characterize the relationship between two continuous variables. Typically, the aim is to forecast the value of an output variable, also known as the response, by analyzing its dependency on the value of an input variable, termed the predictor (Hair et al., 2010).

By fitting a line to the observed data, regression models explain the connection between variables. A straight line is used in linear regression models, whereas a curved line is used in logistic and nonlinear regression models. Regression estimates the change in a dependent variable as the independent variable(s) change (Bevans, 2022).

4.9.1 Simple Regression Analysis (VR – Product)

The analysis of simple regression between VR and product variables was illustrated in Tables 21 to Table 23. The Model Summary in Table 21 the strength of relationship between variables.

Table 21: Model Summary of Simple Regression Analysis (VR – Product)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.885[a]	.784	.783	4.879
a. Predictors: (Constant), VR Adoption Drivers				
b. Dependent Variable: Product Activities				

The result in Table 21 indicates a strong relationship between the predictor variable "VR Adoption Drivers" and the dependent variable "Product Activities." The coefficient of determination (R Square) is 0.784, suggesting that approximately 78.4% of the variance in Product Activities can be explained by VR Adoption Drivers. The adjusted R Square, which considers the number of predictors in the model, remains high at 0.783. The standard error of the estimate is 4.879, indicating the average deviation of the observed values from the predicted values. The significance of the relationship was determined in ANOVA Table 22.

Table 22: ANOVA of Simple Regression Analysis (VR – Product)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	36360.969	1	36360.969	1527.415	.000[b]
	Residual	10022.138	421	23.806		
	Total	46383.106	422			
a. Dependent Variable: Product Activities						
b. Predictors: (Constant), VR Adoption Drivers						

Moving to the ANOVA Table 22, the results indicate a significant regression model ($F(1, 421) = 1527.415$, $p < .0001$). This suggests that the regression model, with "VR Adoption Drivers" as the predictor, significantly explains the variance in Product Activities. The sum of squares for the regression model is 36360.969, indicating the variance explained by the predictor, while the residual sum of squares is 10022.138, representing unexplained variance.

The regression coefficient of the regression shown in Table 23.

Table 23: Coefficients of Simple Regression Analysis (VR – Product)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.931	1.135		-1.701	.090
	VR Adoption Drivers	.693	.018	.885	39.082	.000
a. Dependent Variable: Product Activities						

In the Coefficients Table 23, the intercept (Constant) has a coefficient of -1.931 and is not statistically significant (t = -1.701, p = .090). However, the coefficient for "VR Adoption Drivers" is 0.693, indicating that for every one-unit increase in VR Adoption Drivers, there is an increase of 0.693 units in Product Activities. This coefficient is highly significant (t = 39.082, p < .0001), highlighting the strong impact of VR Adoption Drivers on Product Activities.

4.9.2 Simple Regression Analysis (VR – Distribution)

The analysis of simple regression between VR and Distribution variable was illustrated in Tables 24 to Table 26. The Model Summary in Table 24 the strength of the relationship between variables.

Table 24: Model Summary of Simple Regression Analysis (VR – Distribution)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.777[a]	.604	.603	3.176
a. Predictors: (Constant), VR Adoption Drivers				
b. Dependent Variable: Distribution Activities				

The Model Summary reveals a moderately strong relationship between the predictor variable "VR Adoption Drivers" and the dependent variable "Distribution Activities." The coefficient of determination (R Square) is 0.604, indicating that approximately 60.4% of the variance in Distribution Activities can be explained by VR Adoption Drivers. The adjusted R Square, which adjusts for the number of predictors in the model, remains similar at 0.603. The standard error of the estimate is 3.176, representing the average deviation of observed values from predicted values.

The significance of the relationship was determined in ANOVA Table 25.

Table 25: ANOVA of Simple Regression Analysis (VR – Distribution)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6476.775	1	6476.775	642.041	.000[b]
	Residual	4246.960	421	10.088		
	Total	10723.735	422			
a. Dependent Variable: Distribution Activities						
b. Predictors: (Constant), VR Adoption Drivers						

Turning to the ANOVA Table, the results demonstrate a highly significant regression model (F (1, 421) = 642.041, p < .0001). This indicates that the regression model, with "VR Adoption Drivers" as the predictor, significantly explains the variance in Distribution Activities. The sum of squares for the regression model is 6476.775, representing the variance explained by the predictor, while the residual sum of squares is 4246.960, indicating unexplained variance.

The regression coefficient of the regression shown in Table 26.

Table 26: Coefficients of Simple Regression Analysis (VR – Distribution)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.192	.739		2.966	.003
	VR Adoption Drivers	.292	.012	.777	25.339	.000
a. Dependent Variable: Distribution Activities						

In the Coefficients Table, the intercept (Constant) has a coefficient of 2.192, which is statistically significant (t = 2.966, p = .003). The coefficient for "VR Adoption Drivers" is 0.292, suggesting that for every one-unit increase in VR Adoption Drivers, there is an increase of 0.292 units in Distribution Activities. This coefficient is highly significant (t = 25.339, p < .0001), underscoring the substantial impact of VR Adoption Drivers on Distribution Activities.

4.9.3 Simple Regression Analysis (VR – Pricing)

The analysis of simple regression between VR and Pricing variable was illustrated in Tables 27 to Table 29. The Model Summary in Table 24 the strength of the relationship between variables.

Table 27: Model Summary of Simple Regression Analysis (VR – Pricing)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.729[a]	.531	.530	7.956
a. Predictors: (Constant), VR Adoption Drivers				
b. Dependent Variable: Pricing Activities				

The Model Summary showcases a moderately strong relationship between the predictor variable "VR Adoption Drivers" and the dependent variable "Pricing Activities." The coefficient of determination (R Square) is 0.531, indicating that approximately 53.1% of the variance in Pricing Activities can be explained by VR Adoption Drivers. The adjusted R Square, which considers the number of predictors in the model, remains similar at 0.530. The standard error of the estimate is 7.956, representing the average deviation of observed values from predicted values.

The significance of the relationship was determined in ANOVA Table 28.

Table 28: ANOVA of Simple Regression Analysis (VR – Pricing)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	30163.003	1	30163.003	476.578	.000[b]
	Residual	26645.441	421	63.291		
	Total	56808.444	422			
a. Dependent Variable: Pricing Activities						
b. Predictors: (Constant), VR Adoption Drivers						

Turning to the ANOVA Table, the results demonstrate a highly significant regression model ($F(1, 421) = 476.578$, $p < .0001$). This suggests that the regression model, with "VR Adoption Drivers" as the predictor, significantly explains the variance in Pricing Activities. The sum of squares for the regression model is 30163.003, representing the variance explained by the predictor, while the residual sum of squares is 26645.441, indicating unexplained variance.

The regression coefficient of the regression shown in Table 29.

Table 29: Coefficients of Simple Regression Analysis (VR – Pricing)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.034	1.851		4.340	.000
	VR Adoption Drivers	.631	.029	.729	21.831	.000
a. Dependent Variable: Pricing Activities						

In the Coefficients Table, the intercept (Constant) has a coefficient of 8.034, which is statistically significant ($t = 4.340$, $p < .0001$). The coefficient for "VR Adoption Drivers" is 0.631, suggesting that for every one-unit increase in VR Adoption Drivers, there is an increase of 0.631 units in Pricing Activities. This coefficient is highly significant ($t = 21.831$, $p < .0001$), underscoring the substantial impact of VR Adoption Drivers on Pricing Activities.

4.9.4 Simple Regression Analysis (VR – Promotion)

The analysis of simple regression between VR and Promotion variable was illustrated in Tables 30 to Table 32. The Model Summary in Table 24 the strength of the relationship between variables.

Table 30: Simple Regression Analysis (VR – Promotion) Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.678[a]	.460	.459	6.919
a. Predictors: (Constant), VR Adoption Drivers				
b. Dependent Variable: Promotion Activities				

The Model Summary reveals a moderate relationship between the predictor variable "VR Adoption Drivers" and the dependent variable "Promotion Activities." The coefficient of determination (R Square) is 0.460, indicating that approximately 46.0% of the variance in Promotion Activities can be explained by VR Adoption Drivers. The adjusted R Square, which accounts for the number of predictors in the model, remains consistent at 0.459. The standard error of the estimate is 6.919, representing the average deviation of observed values from predicted values.

The significance of the relationship was determined in ANOVA Table 31.

Table 31: ANOVA of Simple Regression Analysis (VR – Promotion)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17186.770	1	17186.770	359.036	.000[b]
	Residual	20152.932	421	47.869		
	Total	37339.702	422			
a. Dependent Variable: Promotion Activities						
b. Predictors: (Constant), VR Adoption Drivers						

In the ANOVA Table, the results indicate a highly significant regression model ($F(1, 421) = 359.036$, $p < .0001$). This suggests that the regression model, with "VR Adoption Drivers" as the predictor, significantly explains the variance in Promotion Activities. The sum of squares for the regression model is 17186.770, representing the variance explained by the predictor, while the residual sum of squares is 20152.932, indicating unexplained variance.

The regression coefficient of the regression shown in Table 32.

Table 32: Coefficients of Simple Regression Analysis (VR – Promotion)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.990	1.610		5.584	.000
	VR Adoption Drivers	.476	.025	.678	18.948	.000
a. Dependent Variable: Promotion Activities						

In the Coefficients Table, the intercept (Constant) has a coefficient of 8.990, which is statistically significant ($t = 5.584$, $p < .0001$). The coefficient for "VR Adoption Drivers" is 0.476, suggesting that for every one-unit increase in VR Adoption Drivers, there is an increase of 0.476 units in Promotion Activities. This coefficient is highly significant ($t = 18.948$, $p < .0001$), emphasizing the substantial impact of VR Adoption Drivers on Promotion Activities

CHAPTER FIVE: DISCUSSION AND CONCLUSION

5.1 Discussion:

This chapter presents a discussion of the analyzed tables and data. It includes an examination of the questionnaire results in relation to the previously reviewed literature and addresses the acceptance or rejection of the hypothesis. The study aims to explore the impact of virtual reality on the marketing mix (4Ps) within Saudi Arabia's architectural industry.

The result reveled that no statistically significant association between the demographic variables analyzed (years of experience in the architecture industry, years of experience in the current company, managerial level, company role, and company size) and the level of VR adoption in the companies. The analysis revealed that there is no differences between companies demographic group regarding to their VR adoption level. This may because the level of virtual reality adoption relate to the other variables than relate to the companies demographic variables such as number of employees or company role in architecture industry from the research point of view.

Moreover, answering research questions and hypothesis testing was crucial. The following will discuss the research hypotheses separately.

H1: Virtual Reality Has a Significant Positive Effect on the Marketing Element "Place".

After examining the research data, the researcher suggested a hypothesis that virtual reality influences location as a component of the architecture industry's marketing mix.

The study's findings support the concept, which is consistent with other papers, including (Rainoldi et al., 2018; Fakahani et al., 2022).

Virtual reality adoption considerably improves the marketing aspect "Place" by providing immersive and engaging experiences that cross the physical and digital worlds. In the construction business, VR enables stakeholders to explore comprehensive 3D models of projects before they are completed, giving them a realistic sense of scale and design. This skill not only enhances client presentations and marketing activities but also helps to spot possible design difficulties early on, lowering costs and improving decision-making processes. VR's virtual walkthroughs and simulations enhance customer pleasure and trust in projects (Cavallaro et al., 2020).

Furthermore, VR enables remote cooperation and site management, which improves the productivity and efficacy of building projects. By allowing team members to participate in a shared virtual world, VR minimizes the need for actual site visits while also allowing for real-time alterations and updates. This technology also enhances safety training by replicating dangerous events in a controlled virtual environment, therefore lowering on-site hazards and ensuring staff are more prepared. VR is a vital tool for modern construction, improving project visualization, customer interaction, and management (Khorolska et al., 2020).

H2: Virtual Reality Has a Significant Positive Effect on the Marketing Element "Price".

The study hypothesis proposes that there is an effect between virtual reality and pricing as part of the architecture industry's marketing mix. This theory was validated by data analysis in this study, which is consistent with what other studies stated, such as Barnes (2017).

Virtual reality has a big influence on the marketing factor "Price" since it allows for more precise cost estimates and reduces total project expenditure. In the construction business, VR enables thorough pre-construction planning and visualization, which aids in the identification of possible difficulties before they occur on the real site. This foresight

decreases the chance of costly mistakes and rework, resulting in more exact budgeting and effective resource allocation. Virtual reality allows stakeholders to make educated decisions quickly, saving time and money on physical site visits and manual changes (Aylward et al., 2021).

Virtual reality also adds to cost savings by improving safety training and operational efficiency (Li et al., 2018). Construction workers may practice and perfect complicated or dangerous activities in a virtual environment, reducing the chance of accidents and the related expenses of medical treatment and project delays. Furthermore, using VR for remote collaboration and project management reduces the need for extensive travel and on-site supervision, which reduces costs even further. VR can improve price dynamics in the building sector, leading to more competitive pricing and higher profit margins (Arabi, 2024).

H3: Virtual Reality Has a Significant Positive Effect on the Marketing Element "Product"

The data analysis demonstrated a beneficial influence of virtual reality on the product component of the marketing mix 4Ps. Virtual reality has a huge beneficial impact on the marketing factor "Product" since it improves how items are developed, exhibited, and experienced. In the construction business, VR allows for precise visualization of architectural designs and construction plans, allowing stakeholders to experience the product—whether it be a building, room, or landscape—in a completely immersive 3D environment. This immersive experience aids in fine-tuning design aspects and making real-time revisions, ensuring that the finished result matches the highest quality standards and customer expectations. Virtual reality enhances client confidence and pleasure with the product (Woksepp, 2007; Berg & Vance, 2017).

Virtual reality alters product-marketing strategy by allowing prospective customers to interact with and study virtual models of building projects. This capacity is especially useful in real estate and high-value building projects, as customers may virtually tour houses before they are created, experiencing the layout, design, and atmosphere in ways that static photos or 2D blueprints cannot replicate. This participatory approach not only

increases the perceived value of the product, but it also facilitates speedier decision-making and shortens the sales cycle. VR provides a full and compelling product experience, enabling construction enterprises to distinguish their offers and gain a competitive edge (Richir et al., 2015; Shivappa et al., 2016).

H4: Virtual Reality Has a Significant Positive Effect on the Marketing Element "Promotion".

The data analysis demonstrated a beneficial influence of virtual reality on the promotion component of the marketing mix 4Ps. Virtual reality has a significant beneficial impact on the marketing aspect "Promotion" by delivering immersive and engaging experiences that captivate customer attention and develop deeper emotional ties with businesses. In the construction business, virtual reality can change traditional promotional operations by allowing potential clients to visually experience buildings and infrastructure projects before they are built. This immersive experience highlights the company's skills in a captivating way, demonstrating the project's benefits and features more effectively than traditional techniques such as brochures or movies. VR's virtual tours and 3D walkthroughs increase client presentations and marketing initiatives (Wieland et al., 2024).

Using VR in promotional efforts may produce a lot of buzz and engagement, which leads to increased customer interest and participation (Cheah & Shimul, 2023). Companies, for example, may utilize VR to establish virtual open houses or live demos, allowing customers to view a building site or a completed product from a distance. This not only broadens the company's reach to a worldwide audience, but it also gives a unique and memorable experience that may help it stand out from the competition. The immersive quality of VR encourages a higher emotional reaction, making the commercial message more powerful and lasting. Interacting with a virtual world gives consumers a better knowledge of the product, increasing engagement and retention of promotional information (Scholz & Smith, 2016).

Likewise, VR may be an effective tool for gathering data on user interactions, revealing vital information about customer preferences and habits. This information may be utilized

to modify marketing strategy and enhance future promotional efforts. For example, observing how potential clients engage with virtual models might suggest which components of a project are most enticing or which require further attention. These insights enable businesses to modify their promotional content to better fit the requirements and aspirations of their target audience, resulting in more successful marketing campaigns. VR can help construction businesses improve promotional efforts, boost customer involvement, and achieve better marketing outcomes (Barnes S., 2016; Cruz, 2018).

The hypothesis testing findings, as summarized in Table 33, show that virtual reality has a strong beneficial influence on all four aspects of the marketing mix in Saudi Arabia's architectural sector as all regression analysis significant value was less than 0.05. The study discovered that VR improves the "Place" by improving project visualization and client engagement, positively influences the "Price" by allowing precise cost estimations and lowering project costs, improves the "Product" by improving design and client satisfaction, and has a significant impact on the "Promotion" by creating engaging and interactive marketing experiences. The findings validated each hypothesis (H1-H4), proving VR's revolutionary potential throughout the marketing mix.

Table 33: Hypothesis Testing Results Summary

N	Hypothesis	P Value (Sig)	Conclusion
H1	Virtual reality has a significant positive effect on the marketing element "Place".	< 0.05 (Table 22)	supported
H2	Virtual reality has a significant positive effect on the marketing element "Price".	< 0.05 (Table 25)	supported
H3	Virtual reality has a significant positive effect on the marketing element "Product".	< 0.05 (Table 28)	supported
H4	Virtual reality has a significant positive effect on the marketing element of "Promotion"	< 0.05 (Table 31)	supported

5.2 Conclusion

the study revealed that virtual reality (VR) adoption significantly influences the marketing aspects of "place," "price," "product," and "promotion" in Saudi Arabia's architecture sector. VR enhances the "place" aspect by creating immersive experiences that boost project visualization and client engagement, aligning with literature that emphasizes VR's role in transforming spatial understanding and accessibility (Håkansson L., 2018). For the "price" component, VR allows for precise cost estimates and reduces project expenses through effective planning and collaboration, supported by findings that VR enhances cost management and consumer perceptions of value (Li et al., 2008; Martínez-Navarro et al., 2018; Heller et al., 2019).

Regarding "product," VR enables comprehensive and interactive visualization, improving design quality and customer satisfaction, consistent with literature highlighting VR's potential in prototype design and stakeholder involvement (Choi & Cheung, 2008; Bae & Leem, 2014; Souza et al., 2006; Hoffmann et al., 2006.

For "promotion," VR creates engaging and interactive marketing experiences that distinguish businesses from competitors, supported by studies showing VR's impact on consumer interest and purchasing intent (Guixere et al., 2019; Audly et al., 2023). These findings underscore VR's transformational potential in enhancing various aspects of the marketing mix. Architectural firms adopting VR technology can enhance project outcomes, increase client satisfaction, and implement more effective marketing strategies. Future research should explore the long-term benefits of VR, its integration with other emerging technologies, and its cultural adaptation to fully realize its potential in the construction industry.

Specifically, future studies should consider the long-term impact on customer satisfaction and retention, integration with technologies like augmented reality and artificial intelligence, comparative studies across regions and industries, detailed consumer behavior analyses, advancements in VR technologies, cost-benefit analyses, and VR's role in sustainable construction practices. By addressing these areas, future research can

provide deeper insights into VR's strategic implementation in the architectural sector, further enhancing its transformative impact on marketing practices.

To expand on this study's findings, future research should use a multifaceted approach to better comprehend VR's influence on the architecture industry's marketing mix. This includes cross-industry comparisons to identify best practices in industries such as automotive and retail, detailed consumer behavior analyses to tailor VR marketing strategies to diverse demographics, and research into next-generation VR technologies such as higher resolution displays and haptic feedback systems to improve the user experience. Furthermore, conducting cost-benefit analyses to quantify the return on investment (ROI) of VR in marketing, as well as researching how VR can support sustainable construction practices by reducing physical prototypes and improving resource management, will provide more insight into VR's strategic implementation in the architectural sector.

REFERENCES

Ader, H., Mellenbergh, G., & Hand, D. (2011). Advising on Research Methods: A Consultant's Companion. Johannes van Kessel Publishing.

Al-Fadly, A. (2019). Investigating the Effect of Construction Companies' Marketing Mix on the Experience of Customers in the Gulf Region.

Al-Fadly, A. (2020). Price element of marketing mix: Its effect on customer experience in construction industries.

Al-Hathloul, S., & Mughal, M. (2004). Urban growth management-the Saudi experience.

Ali, A. J.-A.-O. (2013). Islamic Perspectives on Profit Maximization.

Aofeng, Z., & Han, B. (2016). Virtual reality in marketing—an explorative study.

AONDO, R. (2020). Transformational Leadership Style, Staff Loyalty, Internal Environment and Performance of Chartered Universities in Kenya.

Arabi, K. (2024). Virtual Reality in Construction.

Audly, T., Susanti, R., Hermayanti, Y., & Yamin, A. (2023). 4P Relationship (Product, Price, Place, Promotion) In Purchasing Decisions for Virtual Reality (VR) As A Learning Medium for Nursing Students.

Ausburn, L., & Ausburn, F. (2004). Desktop virtual reality: A powerful new technology for teaching and research in industrial teacher education.

Aylward, K., Dahlman, J., Nordby, K., & Lundh, M. (2021). Using Operational Scenarios in a Virtual Reality Enhanced Design Process.

Babbie, E. (2010). The practice of social research (12th Edition). Wadsworth, Belmont.

Bae, D., & Leem, C. (2014). A visual interactive method for service prototyping.

Ball, C., Huang, K.-T., & Francis, J. (2021). Virtual Reality Adoption during the COVID-19 Pandemic: A Uses and Gratifications Perspective. Telematics and Informatics.

Barnes, S. (2016). Understanding Virtual Reality in Marketing: Nature, Implications and Potential.

Bell, E., & Bryman, A. (2015). Business Research Methods. USA: Oxford University Press.

Berg, L., & Vance, J. (2017). Industry use of virtual reality in product design and manufacturing: a survey.

Bevans, R. (2022). Simple Linear Regression | An Easy Introduction & Examples. https://www.scribbr.com/statistics/simple-linear-regression/.

Borden, N. H. (1984). The concept of marketing mix.

Boton, C. (2018). Supporting constructability analysis meetings with Immersive Virtual Reality-based collaborative BIM 4D simulation, Autom.

Bozdogan, S. (2014). Vernacular Architecture and Identity Politics: The Case of the "Turkish House".

Burke, R. R. (2018). Virtual reality for marketing research.

Campbell, D., & Wells, M. (1994). A critique of virtual reality in the architectural design process.

Capon, N., & Hulbert, J. (2000). Marketing in the 21st Century.

Cavallaro, S., De Canio, F., Peruzzini, M., & Grandi, F. (2020). Virtual Tours to Promote the Remote Customer Experience.

Cheah, I., & Shimul, A. (2023). Marketing in the metaverse: Moving forward – What's next?

Chemo, D. Samanta, S. & Singh, S. (2023). Evolution of Marketing mix Strategy from Genesis to today.

Chen, C.-H., Yang, J.-C., Shen, S., & Jeng, M.-C. (2007). A desktop virtual reality earth motion system in astronomy education.

Choi, S., & Cheung, H. (2008). A versatile virtual prototyping system for rapid product development.

Cohen, J., Cohen, P., West, S., & Aiken, L. (2003). Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences (3rd edition). Mahwah, NJ: Lawrence Erlbaum Associates.

Coyne, R., & Subrahmanian, E. (1993). Computer-supported creative design: A pragmatic approach.

Cronbach, L. (1951). Coefficient Alpha and The Internal Structure of Tests. UNIVERSITY OF ILLINOIS.

Cruz, T. V. (2018). Virtual reality in the architecture, engineering, and construction industry proposal of an interactive collaboration application.

Danaci, H., & Çakmak, A. (2022). COMPUTER-AIDED DESIGN and VIRTUAL REALITY in ARCHITECTURE.

Davila Delgado, J. M., Oyedele, L., Demian, P., & Beach, T. (2020). A research agenda for augmented and virtual reality in architecture, engineering, and construction.

Delgado, J., Oyedele, L., Demian, P., & Beach, T. (2020). A research agenda for augmented and virtual reality in architecture, engineering, and construction.

Delgado, M. D., Oyedele, L., Beach, T., & Demian, P. (2020). Augmented and Virtual Reality in Construction: Drivers and Limitations for Industry Adoption. Journal of Construction Engineering and Management.

DeVellis, R. F. (2017). Scale development: Theory and applications (4th ed.). Sage Publications.

Du, J., Zou, Z., & Shi, Y. (2018). Zero latency: Real-time synchronization of BIM data in virtual reality for collaborative decision-making.

Dunston, P., Arns, L., McGlothlin, J., & Lasker, G. (2011). An Immersive Virtual Reality Mock-Up for Design Review of Hospital Patient Rooms.

El Beheiry, M., Doutreligne, S., Caporal, C., Ostertag, C., Dahan, M., & Masson, J.-B. (2019). Virtual Reality: Beyond Visualization.

Fakahani, L., Aljehani, S., Baghdadi, R., & El-Shorbagy, A.-M. (2022). The Use and Challenges of Virtual Reality in Architecture.

Fakahani, L., Aljehani, S., Baghdadi, R., & El-Shorbagy, A.-M. (2022). The Use and Challenges of Virtual Reality in Architecture.

Fakahani, L., Aljehani, S., Baghdadi, R., & El-Shorbagy, A.-M. (2022). The Use and Challenges of Virtual Reality in Architecture.

Fanto, E. (2021). The influence of the marketing mix on the decision to purchase SAMSUNG smartphones.

Fox, J. (2015). Applied regression analysis and generalized linear models (3rd ed.). Sage Publications.

Franco, T. (2018). What is BIM and Why Does It Seem to be.

Donders, R., van der Heijden, G., Stijnen, T., & Moons, K. (2006). A gentle introduction to imputation of missing values. Journal of Clinical Epidemiology.

Dris, A.-S., Lehericey, F., & Gouranton, V. (2019). OpenBIM Based IVE Ontology: An Ontological Approach to Improve Interoperability for Virtual Reality Applications: Proceedings of the 35th CIB W78 2018 Conference: IT in Design, Construction, and Management.

Ader, H., Mellenbergh, G., & Hand, D. (2011). Advising on Research Methods: A Consultant's Companion. Johannes van Kessel Publishing.

Al-Fadly, A. (2019). Investigating the Effect of Construction Companies' Marketing Mix on the Experience of Customers in the Gulf Region.

Al-Fadly, A. (2020). Price element of marketing mix: Its effect on customer experience in construction industries.

Al-Hathloul, S., & Mughal, M. (2004). Urban growth management-the Saudi experience.

Ali, A. J.-A.-O. (2013). Islamic Perspectives on Profit Maximization.

Aofeng, Z., & Han, B. (2016). Virtual reality in marketing—an explorative study.

AONDO, R. (2020). Transformational Leadership Style, Staff Loyalty, Internal Environment and Performance of Chartered Universities in Kenya.

Arabi, K. (2024). Virtual Reality in Construction.

Audly, T., Susanti, R., Hermayanti, Y., & Yamin, A. (2023). 4P Relationship (Product, Price, Place, Promotion) In Purchasing Decisions for Virtual Reality (VR) As A Learning Medium for Nursing Students.

Ausburn, L., & Ausburn, F. (2004). Desktop virtual reality: A powerful new technology for teaching and research in industrial teacher education.

Aylward, K., Dahlman, J., Nordby, K., & Lundh, M. (2021). Using Operational Scenarios in a Virtual Reality Enhanced Design Process.

Babbie, E. (2010). The practice of social research (12th Edition). Wadsworth, Belmont.

Bae, D., & Leem, C. (2014). A visual interactive method for service prototyping.

Ball, C., Huang, K.-T., & Francis, J. (2021). Virtual Reality Adoption during the COVID-19 Pandemic: A Uses and Gratifications Perspective. Telematics and Informatics.

Barnes, S. (2016). Understanding Virtual Reality in Marketing: Nature, Implications and Potential.

Barnes, S. (2016). Understanding Virtual reality in Marketing: nature, implications and potential.

Barnes, S. (2017). Understanding Virtual Reality in Marketing: Nature, Implications and Potential.

Berg, L., & Vance, J. (2017). Industry use of virtual reality in product design and manufacturing: a survey.

Bevans, R. (2022). Simple Linear Regression | An Easy Introduction & Examples. https://www.scribbr.com/statistics/simple-linear-regression/.

Borden, N. H. (1984). The concept of marketing mix.

Boton, C. (2018). Supporting constructability analysis meetings with Immersive Virtual Reality-based collaborative BIM 4D simulation, Autom.

Bozdogan, S. (2014). Vernacular Architecture and Identity Politics: The Case of the "Turkish House".

Burke, R. R. (2018). Virtual reality for marketing research.

Bell, E., & Bryman, A. (2015). Business Research Methods. USA: Oxford University Press.

Campbell, D., & Wells, M. (1994). A critique of virtual reality in the architectural design process.

Capon, N., & Hulbert, J. (2000). Marketing in the 21st Century.

Cavallaro, S., De Canio, F., Peruzzini, M., & Grandi, F. (2020). Virtual Tours to Promote the Remote Customer Experience.

Cheah, I., & Shimul, A. (2023). Marketing in the metaverse: Moving forward – What's next?

Chen, C.-H., Yang, J.-C., Shen, S., & Jeng, M.-C. (2007). A desktop virtual reality earth motion system in astronomy education.

Choi, S., & Cheung, H. (2008). A versatile virtual prototyping system for rapid product development.

Cohen, J., Cohen, P., West, S., & Aiken, L. (2003). Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences (3rd edition). Mahwah, NJ: Lawrence Erlbaum Associates.

Coyne, R., & Subrahmanian, E. (1993). Computer supported creative design: A pragmatic approach.

Cronbach, L. (1951). Coefficient Alpha and The Internal Structure Of Tests. UNIVERSITY OF ILLINOIS.

Cruz, T. V. (2018). Virtual reality in the architecture, engineering and construction industry proposal of an interactive collaboration application.

Danaci, H., & Çakmak, A. (2022). COMPUTER-AIDED DESIGN and VIRTUAL REALITY in ARCHITECTURE.

Davila Delgado, J. M., Oyedele, L., Demian, P., & Beach, T. (2020). A research agenda for augmented and virtual reality in architecture, engineering and construction.

Delgado, J., Oyedele, L., Demian, P., & Beach, T. (2020). A research agenda for augmented and virtual reality in architecture, engineering and construction.

Delgado, M. D., Oyedele, L., Beach, T., & Demian, P. (2020). Augmented and Virtual Reality in Construction: Drivers and Limitations for Industry Adoption. Journal of Construction Engineering and Management.

DeVellis, R. F. (2017). Scale development: Theory and applications (4th ed.). Sage Publications.

Du, J., Zou, Z., & Shi, Y. (2018). Zero latency: Real-time synchronization of BIM data in virtual reality for collaborative decision-making.

Dunston, P., Arns, L., McGlothlin, J., & Lasker, G. (2011). An Immersive Virtual Reality Mock-Up for Design Review of Hospital Patient Rooms.

El Beheiry, M., Doutreligne, S., Caporal, C., Ostertag, C., Dahan, M., & Masson, J.-B. (2019). Virtual Reality: Beyond Visualization.

Fakahani, L., Aljehani, S., Baghdadi, R., & El-Shorbagy, A.-M. (2022). The Use and Challenges of Virtual Reality in Architecture.

Fakahani, L., Aljehani, S., Baghdadi, R., & El-Shorbagy, A.-M. (2022). The Use and Challenges of Virtual Reality in Architecture.

Fakahani, L., Aljehani, S., Baghdadi, R., & El-Shorbagy, A.-M. (2022). The Use and Challenges of Virtual Reality in Architecture.

Fanto, E. (2021). The influence of the marketing mix on the decision to purchase SAMSUNG smartphones.

Fox, J. (2015). Applied regression analysis and generalized linear models (3rd ed.). Sage Publications.

Franco, T. (2018). What is BIM and Why Does it Seem to be?

Gheisari, M., & Irizarry, J. (2016). Investigating human and technological requirements for successful implementation of a BIM-based mobile augmented reality environment in facility management practices.

Ghobadi, M., & Sepasgozar, S. (2020). An Investigation of Virtual Reality Technology Adoption in the Construction Industry.

Goi, C. (2011). Perception of Consumer on Marketing Mix: Male vs. Female.

Guixeres, J., Bigné, E., & Alcañiz, M. (2019). Virtual Reality in Marketing: A Framework, Review, and Research Agenda.

Hair, J., Black, W., Babin, B., & Anderson, R. (2010). Multivariate data analysis (7th ed.). Upper Saddle River, NJ: Pearson Education.

Håkansson, L. (2018). Virtual and Augmented Reality in Marketing.

Hartline, M., & Ferrell, O. (2005). Marketing strategy (3rd ed.).

Heller, J., Chylinski, M., Ruyter, K., Mahr, D., & Keeling, D. (2019). Touching the Untouchable: Exploring Multi-Sensory Augmented Reality in the Context of Online Retailing.

Hoffmann, H., Stefani, O., & Patel, H. (2006). Extending the desktop workplace by a portable virtual reality system.

Jiang, Z., & Benbasat, I. (2004). Virtual Product Experience: Effects of Visual and Functional Control of Products on Perceived Diagnosticity and Flow in Electronic Shopping.

Jobber, D. (2007). Principles and Practice of Marketing, 5th edition.

Johnson, R., & Wichern, D. (2007). Applied multivariate statistical analysis (6th ed.). Prentice Hall.

Juan, Y.-K., Chen, H.-H., & Chi, H.-Y. (2018). Developing and evaluating a virtual reality-based navigation system for pre-sale housing sales.

Kalisperis, L., Otto, G., Muramoto, K., Gundrum, J., Masters, R., & Orland, B. (2002). Virtual Reality/Space Visualization in Design Education: The VR-Desktop Initiative.

Kamasak, R. (2013). How Marketing Capabilities Create Competitive Advantage in Turkey.

Kandaurova, M., & (Mark) Lee, S. (2019). The effects of Virtual Reality (VR) on charitable giving: The role of empathy, guilt, responsibility, and social exclusion.

Kerawalla, L., Luckin, R., Seljeflot, S., & Woolard, A. (2006). "Making it real": Exploring the potential of augmented reality for teaching primary school science.

Khan, M. T. (2014). The Concept of 'Marketing Mix' and its Elements.

Khorolska, K., Bebeshko, B., & Tsiutsiura, S. (2020). VR-TECHNOLOGY AS A MODERN ARCHITECTURE TOOL.

Lawson, G., Salanitri, D., & Waterfield, B. (2016). Future directions for the development of virtual reality within an automotive manufacturer.

Le, Q., Pedro, A., Pham, H., & Park, C. (2016). A Virtual World Based Construction Defect Game for Interactive and Experiential Learning.

Lee, J., Kim, J., & Choi, J. (July 2019). The adoption of virtual reality devices: The technology acceptance model integrating enjoyment, social interaction, and strength of the social ties. Telematics and Informatics.

Lee, S.-L., & Smith, S.-F. (2004). A pilot study for integrating virtual reality into an introductory design and graphics course.

Lewis, D., & Bridger, D. (2000). The soul of the new consumer: authenticity - what we buy and why in the new economy.

Li, H., Daugherty, T., & Biocca, F. (2008). The role of virtual experience in consumer learning.

Li, X., Yi, W., Chi, H.-L., Wang, X., & Chan, A. (2018). A critical review of virtual and augmented reality (VR/AR) applications in construction safety.

Loureiro, S., Guerreiro, J., Eloy, S., Langaro, D., & Panchapakesan, P. (2019). Understanding the use of Virtual Reality in Marketing: a text mining-based review.

Lovelock, C., & Wright, L. (2002). Principles of service marketing and management.

M., S. (2012). Marketing Mix of 4P'S for Competitive Advantage.

Martínez-Navarro, J., Bigné, E., Guixeres, J., Alcañiz, M., & Torrecilla, C. (2018). The influence of virtual reality in e-commerce.

Mawlana, M., Vahdatikhaki, F., Doriani, A., & Hammad, A. (2015). Integrating 4D modeling and discrete event simulation for phasing evaluation of elevated urban highway reconstruction projects.

Milgram, P., & Colquhoun, H. (1999). A taxonomy of real and virtual world display integration.

Muala, A., & Qurneh, M. (2012). Assessing the Relationship Between Marketing Mix and Loyalty Through Tourists Satisfaction in Jordan Curative Tourism.

Munusamy, J., & Hoo, W. (2008). Relationship between marketing mix strategy and consumer motive: An empirical study in major tesco stores.

Onyesolu, M., & Eze, F. (2011). Understanding Virtual Reality Technology: Advances and Applications.

Ozaslan, N. &. (2011). Architecture and Image: The Example of Turkey.

Paes, D., Arantes, E., & Irizarry, J. (2017). Immersive environment for improving the understanding of architectural 3D models: Comparing user spatial perception between immersive and traditional virtual reality systems. Automation in Construction.

Park, C., Le, Q., Pedro, A., & Lim, C. (2015). Interactive building anatomy modeling for experiential building construction education.

Rainoldi, M., Driescher, V., Lisnevska, A., Zvereva, D., Stavinska, A., Relota, J., & Egger, R. (2018). Virtual Reality: An Innovative Tool in Destinations' Marketing. The Gaze Journal of Tourism and Hospitality.

Riaz, W., & Tanveer, A. (n.d). Marketing Mix, Not Branding. Asian Journal of Business and Management Sciences.

Rice, A. (2003). Exploring the Impact of Emerging Landscape Visualization Tools on Spatial Perception and Design Education.

Richir, S., Fuchs, P., Millet, D., & Lourdeaux, D. (2015). How to design a compelling Virtual Reality or Augmented Reality experience?

Ross, G. (2012). Re-thinking and re-tooling the social marketing mix.

Sawhney, A., Marble, J., Mund, A., & Vamadevan, A. (2000). Internet-based interactive construction management learning system.

Schindler, P., & Cooper, D. (2003). Business Research Methods. New York, NY: McGraw-Hill/Irwin.

Schlosser, A. E. (2003). Experiencing products in the virtual world: The role of goal and imagery in influencing attitudes versus purchase intentions.

Scholz, J., & Smith, A. (2016). Augmented Reality: Designing Immersive Experiences That Maximize Consumer Engagement.

Sekaran, U., & Bougie, R. (2016). Research Methods for Business: A Skill Building Approach.

Setareh, M., Bowman, D., & Kalita, A. (2005). Development of a virtual reality structural analysis system.

Shivappa, S., Morrell, M., Sen, D., Peters, N., & Salehin, S. (2016). Efficient, Compelling, and Immersive VR Audio Experience Using Scene Based Audio/Higher Order Ambisonics.

Souza, M., Sacco, M., & Porto, A. (2006). Virtual manufacturing as a way for the factory of the future.

Sun, C., Hu, W., & Xu, D. (2018). Navigation modes, operation methods, observation scales, and background options in UI Design.

Tanner, R., Ferraro, R., Chartrand, T., Bettman, J., & Baaren, R. (2008). Of Chameleons and Consumption: The Impact of Mimicry on Choice and Preferences.

Valenzuela, A., & Hadi, R. (2020). Good Vibrations: Consumer Responses to Technology-Mediated Haptic Feedback.

Vergara, D., Rubio, M., & Lorenzo, M. (2016). New approach for teaching concrete compression tests in large groups of engineering students.

Waly, A., & Thabet, W. (2003). A virtual construction environment for preconstruction planning.

Wang, J., Wang, X., Shou, W., & Xu, B. (2014). Integrating BIM and augmented reality for interactive architectural visualization.

Wedel, M., & Kannan, P. (2016). Marketing Analytics for Data-Rich Environments.

Wieland, D., Ivens, B., Kutschma, E., & Rauschnabel, P. (2024). Augmented and Virtual Reality in Managing B2B Customer Experiences.

Woksepp, S. (2007). Virtual reality in construction: tools, methods and processes.

Woodward, C., & Hakkarainen, M. (2011). Mobile mixed reality system for architectural and construction site visualization.

Xia, S. (2013). Design and implementation of campus 3D virtual walkthrough system - take hunan science and technology university as an example.

Yessios, C. (1987). The Computability of Void Architectural Modeling.

Appendix A: Study Questionnaire

1. Please indicate your gender by marking one of the following options:
   Male [ ] Female [ ]

2. Please indicate your educational level by marking one of the following options:
   [ ] Less than high school.
   [ ] High school degree.
   [ ] University degree.
   [ ] Masters' degree.
   [ ] PhD degree.

3. Please indicate your age by marking one of the following options:
   [ ] Less than 25 years old.
   [ ] 25 to less than 35 years old.
   [ ] 35 to less than 45 years old.
   [ ] 45 to less than 55 years old.
   [ ] 55 to less than 65 years old.
   [ ] 65 years old or more.

4. Please indicate your years of experience in the architecture industry (in general) by marking one of the following options:
   [ ] Less than four years.
   [ ] Four to less than eight years.
   [ ] Eight to less than twelve years.
   [ ] Twelve to less than sixteen years.
   [ ] Sixteen to less than twenty years.
   [ ] Twenty years or more.

5. Please indicate your years of experience in your current company by marking one of the following options:
   [ ] Less than four years.
   [ ] Four to less than eight years.
   [ ] Eight to less than twelve years.
   [ ] Twelve to less than sixteen years.
   [ ] Sixteen to less than twenty years.
   [ ] Twenty years or more.

6. Please indicate the managerial level of your current position by marking one of the following options:

[ ] Top Management level.
[ ] senior management level.
[ ] middle management level.
[ ] front-line management level.

7. Please indicate your company Role in the Architectural Industry:
   [ ] Architect
   [ ] Marketer
   [ ] Contractor
   [ ] Client/End User
   [ ] Other
8. Please indicate your company Years of Experience in the Architectural Industry:
   [ ] Less than 1 year
   [ ] From 1 year and less than 5 years
   [ ] From 5 years and less than 10 years
   [ ] From 10 years and less than 15 years
   [ ] 15 years or more
9. Please indicate your company size:
   [ ] Less than 10 employees
   [ ] From 10 and less than 50 employees
   [ ] 50 employees or more
10. To what extent do you use virtual reality in architectural products?
    [ ] Not adopted
    [ ] Pre-design Phase
    [ ] Schematic Design
    [ ] Design Development
    [ ] Construction Documents

11. The following are statements about your company's product activities. Please indicate your opinion about these statements by marking only one option that corresponds to your level of agreement, or disagreement, with each of the statements at Table 34:

	Reference: Al-Fadly, A. (2019). Investigating the Effect of Construction Companies' Marketing Mix on the Experience of Customers in the Gulf Region.	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1	Our range of brands helps the consumer to make better choices.					
2	Our marketing strategy helps the consumer to develop an ongoing relationship with a product.					
3	Our marketing strategy clearly differentiates our product from its competitors.					

4	Our services do always increase the attractiveness of our product offers to customers.					
5	It is easy to define our product's market position in terms of attributes that are important to the buyer.					
6	We conduct market research to know how our customers think about our products.					
7	We do always use customer related data to plan our product strategy.					
8	Our marketing strategy emphasizes on delivering the 'right' quality of products to customers.					
9	Our products and services do always meet the requirements of our customers.					
10	Our product strategy emphasized the benefits of the product to customers rather than the features of the product.					
11	We focus on the development of new markets relative to competitors.					
12	We focus on offering 'specialized' services to our customers.					
13	We focus on providing unique services not offered by competitors.					
14	We focus on serving more diverse segments of customer than our competitors.					

Table 34: The Company's Product Activities

12. The following are statements about your company's distribution activities. Please indicate your opinion about these statements by marking only one option that corresponds to your level of agreement, or disagreement, with each of the statements at Table 35:

	Reference: Al-Fadly, A. (2019). Investigating the Effect of Construction Companies' Marketing Mix on the Experience of Customers in the Gulf Region.	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1	Our company can reach a wide geographic coverage of customers.					
2	It is easy for our company to access the targeted segment of the market.					
3	Our company can display our products appropriately.					
4	We take care of the movement and handling of goods and materials outwards from site to the customer's location.					
5	Our company can provide necessary customer service pre- and post-sale.					

6	Extensive geographic areas are served by our company efficiently and cost effectively through networks of sales representative.					
7	We hold designs under controlled conditions in terms of codes, specifications					

Table 35: The Company's Distribution Activities

13. The following are statements about your company's pricing activities. Please indicate your opinion about these statements by marking only one option that corresponds to your level of agreement, or disagreement, with each of the statements at Table 36:

	Reference: Al-Fadly, A. (2019). Investigating the Effect of Construction Companies' Marketing Mix on the Experience of Customers in the Gulf Region.	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1	Our prices reinforce the quality image of the product					
2	Our prices support the product and service package to increase customers' value for money.					
3	Our prices emphasize the long-term cost savings coming from using our products compared with the cheaper competition.					
4	Our prices are consistently competitive.					
5	Our prices consider what a customer is prepared to pay for the product.					
6	Our prices are designed to achieve high market share and customer loyalty.					
7	The effect of our prices on the consumer's attitude and buying decision is positive.					
8	We set higher prices to differentiate our products from those of the competitors.					
9	We can determine the price sensitivity of our customers in the market.					
10	Our pricing's messages is consistent with the rest of the marketing mix.					
11	Our prices can take into consideration differences in lifestyles and price perceptions among consumers.					
12	We expand our market share through lower pricing.					
13	We reinforce our product's market position through appropriate pricing.					
14	We stimulate high volume sales through price reductions.					
15	It is easy for our company not to get drawn into price wars.					

16	Our prices help to differentiate our product through positioning it in a different price level from the competition.					

Table 36: The Company's Pricing Activities

14. The following are statements about your company's promotion activities. Please indicate your opinion about these statements by marking only one option that corresponds to your level of agreement, or disagreement, with each of the statements at Table 37:

	Reference: Al-Fadly, A. (2019). Investigating the Effect of Construction Companies' Marketing Mix on the Experience of Customers in the Gulf Region.	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
1	We use promotional methods to motivate potential new customers.					
2	Our promotion activities do emphasize product benefits to customers.					
3	We do usually use social media to get customers' feedback.					
4	In our communication with customers, we take into consideration the popularity or fashionability of different media channels.					
5	In our communication with customers, we take into consideration the popularity or fashionability of different communication techniques and promotional methods.					
6	In our communication with customers, we take into consideration the acceptability of certain approaches to advertising.					
7	Our promotion activities are giving the consumer a clear reason for 'buying' from our company.					
8	Our promotion activities are giving the consumer a clear reason for 'buying' from our company.					
9	Our company keeps an eye on how the competition is communicating with their customers.					
10	We give customers a scope for price negotiation, to let them feel they are gaining value when dealing with us.					
11	We give customers a scope for price negotiation, to let them feel they are gaining value when dealing with us.					
12	Our promotion activities do emphasize product benefits to customers.					
13	Our promotion activities target old customers who have bought from us before.					

Table 37: The Company's Promotion Activities

15. The following are statements about your company's VR adoption drivers. Please indicate your opinion about these statements by marking only one option that corresponds to your level of agreement, or disagreement, with each of the statements below:

	Reference: Davila Delgado, J. M., Oyedele, L., Beach, T., & Demian, P. (2020). Augmented and virtual reality in construction: drivers and limitations for industry adoption. *Journal of construction engineering and management*, *146*(7), 04020079.	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Improving performance in projects						
1	VR will reduce overall spending in projects					
2	The need to increase labor productivity in the sector.					
3	VR contributes to better project delivery.					
4	Difficulties to access labor will drive adoption.					
5	VR improves collaboration between parties.					
6	VR improves project understanding.					
7	Government incentives.					
8	Decrease in construction budgets will drive adoption.					
Improving the companies' image						
1	To be part of the trend.					
2	Obtaining a differentiating advantage in the market.					
3	Strategic decision from top management.					
4	Improves the reputation of the organization.					
5	Client requires the use of VR.					
Improving companies' overall performance						
1	A way to provide new and better services.					
2	Improves the organization's work culture.					
3	Enables market expansion.					
4	Organization's need to be more efficient and productive.					
5	VR reduces overall risks.					
Bolstering research and development						
1	Fostering research curiosity of the employees.					
2	Increasing R&D investment in the construction sector.					
3	Adequate marketing of VR technologies					

Table 38: The Company's VR Adoption Drivers