

## Article

# SOCIAL MEDIA, AFFILIATE MARKETING AND E-MARKETING: EMPIRICAL DRIVERS FOR CONSUMER PURCHASING DECISION IN REAL ESTATE SECTOR OF BANGLADESH

MKA Shahinoor Rahman Jahid<sup>1</sup>;

<sup>1</sup> Chief Executive Officer (CEO), GM Holdings Limited (Deshbandhu Group), Dhaka, Bangladesh; Email: [mkajahid@gmail.com](mailto:mkajahid@gmail.com)

## ABSTRACT

This study investigates the influence of social media marketing, affiliate marketing, and e-marketing on consumer purchasing decisions in Bangladesh's real estate sector, highlighting how digital platforms are reshaping buyer behavior in high-involvement markets. Drawing on quantitative data from 406 respondents in Dhaka, Chattogram, and Sylhet, the research employed a structured questionnaire tested for reliability through Cronbach's Alpha ( $\alpha = 0.78-0.85$ ) and validity via exploratory factor analysis ( $KMO = 0.78-0.84$ ; variance explained = 68–75%). Pearson's correlation revealed strong and significant positive relationships between social media ( $r = 0.71, p < 0.01$ ), e-marketing ( $r = 0.68, p < 0.01$ ), and affiliate marketing ( $r = 0.65, p < 0.01$ ) with purchase decisions, while regression analysis confirmed their predictive power, explaining 67% of the variance ( $R^2 = 0.67, F = 89.24, p < 0.001$ ). Social media emerged as the strongest predictor ( $\beta = 0.41$ ), followed by e-marketing ( $\beta = 0.36$ ) and affiliate marketing ( $\beta = 0.32$ ), with diagnostic checks confirming no multicollinearity or autocorrelation issues. These findings support all three hypotheses, aligning with international literature on the growing importance of digital channels in real estate, while also revealing contextual differences in Bangladesh, where buyers often follow a hybrid decision-making process by combining digital exploration with in-person property visits. Theoretically, the results affirm relational marketing and electronic word-of-mouth theories, the technology acceptance model, and trust-transfer frameworks, while practically they underscore the need for firms to allocate 40–50% of budgets to social media, invest in immersive e-marketing tools such as 3D tours and AI chatbots, and establish structured affiliate programs with credible local agents and influencers. Policymakers are urged to strengthen trust in digital transactions through regulatory frameworks, promote prop-tech startups via tax incentives and grants, and launch digital literacy programs to protect vulnerable buyers. While the study provides robust insights, limitations include urban sampling bias, reliance on self-reported and cross-sectional data, and the absence of qualitative perspectives.

## KEYWORDS

Social Media Marketing; E-Marketing; Affiliate Marketing; Real Estate Consumer Behavior; Bangladesh Housing Market;

## Citation:

Jahid, M. K. S. R. (2024). Social media, affiliate marketing and e-marketing: Empirical drivers for consumer purchasing decision in real estate sector of Bangladesh. *American Journal of Interdisciplinary Studies*, 5(2), 64–87. <https://doi.org/10.63125/7c1ghy29>

## Received:

March 17, 2024

## Revised:

April 20, 2024

## Accepted:

May 16, 2024

## Published:

June 28, 2024



## Copyright:

© 2024 by the author. This article is published under the license of American Scholarly Publishing Group Inc and is available for open access.

## INTRODUCTION

The real estate sector in Bangladesh has experienced remarkable growth and transformation over the past four decades, evolving from a relatively modest industry in the late 1970s and early 1980s into one of the most dynamic sectors in the country. This transformation has been largely fueled by the rapid pace of urbanization, a growing middle class, increased remittance inflows, infrastructure development, and the overall expansion of the national economy. As of 2024, the real estate market was valued at approximately BDT 2.58 trillion, and it is projected to reach BDT 2.94 trillion by 2025, reflecting the increasing contribution of this sector to the national GDP, which stands at 7.96% (Haider, 2024). In urban centers such as Dhaka, Chattogram, Sylhet, and Khulna, the demand for housing has surged, driven by both internal migration and the rising aspirations of the urban population. An estimated 500,000 new housing units are needed annually to meet the growing demand, underscoring the critical role of the real estate sector in national development and social stability (Haider, 2024). Despite these impressive figures, the sector also faces significant structural and operational challenges. High property prices, scarcity of land in urban areas, bureaucratic delays in project approvals, lack of coordinated urban planning, and the rising cost of construction materials are major issues that affect both developers and buyers (Tasreen, 2019). Moreover, unplanned urban sprawl has led to environmental degradation and inefficiencies in infrastructure development (Anisur, 2023). These challenges not only hinder sustainable urban growth but also create affordability and accessibility issues for low- and middle-income groups (World Cities Report, 2020).

In response to these challenges and in alignment with global digitalization trends, the real estate sector in Bangladesh has increasingly turned to digital marketing tools and platforms to enhance visibility, reduce customer acquisition costs, and streamline the buying process (Islam, & Habib, 2022). The proliferation of internet connectivity, smartphones, and digital literacy has changed how consumers search for, evaluate, and purchase properties (Khatun, & Jahan, 2021). Traditional marketing strategies such as billboard advertising, newspaper listings, and physical site visits are gradually being supplemented or even replaced by more dynamic and interactive digital tools. Among these, social media, affiliate marketing, and e-marketing have emerged as influential components in shaping consumer purchasing decisions. Moreover, Social media, particularly platforms like Facebook, Instagram, YouTube, and LinkedIn, has revolutionized how real estate companies interact with potential buyers (Păunescu, & Răboțu, 2022). Through targeted advertisements, video walkthroughs, client testimonials, and interactive Q&A sessions, companies can build brand awareness, showcase ongoing projects, and engage with audiences in real time. The ability to personalize content based on consumer preferences and behavioral data allows for a more tailored approach that enhances customer engagement and fosters emotional connections with the brand. Moreover, social proof via likes, shares, reviews, and influencer endorsements plays a crucial role in building trust and reducing the perceived risk associated with high-value purchases like real estate.

Affiliate marketing has also become a game-changer in the Bangladeshi real estate industry. This performance-based strategy involves partnering with third-party affiliates such as real estate agents, property bloggers, influencers, and digital platforms who promote properties in exchange for a commission (Ali, & Islam, 2023). This model offers a cost-effective and scalable approach to reach niche markets and tap into audiences that traditional channels may not effectively access. Affiliates, often with established credibility and loyal followers, act as trusted intermediaries who can influence buyer perceptions and drive lead generation (Charlesworth, 2018). This system also fosters a win-win environment where real estate companies benefit from increased exposure while affiliates are incentivized through measurable performance outcomes. Furthermore, E-marketing, encompassing a broad range of digital tools including websites, email campaigns, search engine optimization (SEO), mobile applications, and virtual property tours, has further streamlined the real estate buying journey (Chaffey, & Ellis-Chadwick, 2019). Potential buyers can now explore multiple properties from the comfort of their homes, compare features and prices, schedule virtual consultations, and even make down payments online (Chaffey, & Ellis-Chadwick, 2019). These platforms reduce the need for physical site visits and enable a more efficient and transparent decision-making process. Features such as live chat support, mortgage calculators, location-based search filters, and user-generated content enhance user experience and empower consumers with information critical to making informed choices. Therefore, this study aims to fill that critical gap by systematically investigating how

social media, affiliate marketing, and e-marketing influence the purchasing decisions of real estate buyers in Bangladesh. The research will explore key aspects such as consumer trust, brand loyalty, perceived value, and the effectiveness of different digital touchpoints across the buyer journey. By providing data-driven insights into these areas, the study hopes to assist real estate marketers, developers, digital strategists, and policymakers in formulating more effective marketing strategies that align with contemporary consumer behavior and technological trends (Chaffey, & Smith, 2017). Ultimately, the findings will contribute to a deeper understanding of the evolving relationship between digital marketing and consumer decision-making in Bangladesh's real estate landscape.

### **Problem Statement**

The real estate sector in Bangladesh is undergoing a digital transformation, with increasing numbers of developers, agents, and buyers shifting towards online platforms for property marketing, search, and transactions (Tajul, 2025). Tools such as social media, affiliate marketing, and e-marketing are becoming central to real estate marketing strategies as companies seek to adapt to changing consumer behavior and technological advancement. However, despite this growing reliance on digital channels, there remains a critical lack of empirical research and practical understanding of how these tools collectively influence consumer purchasing decisions within the Bangladeshi real estate market. While global studies have demonstrated the potential of digital marketing to increase consumer engagement and drive sales, the unique socio-cultural and economic dynamics in Bangladesh present a distinct context that is not well represented in existing literature. In practice, many real estate companies in Bangladesh struggle to fully leverage digital marketing tools to their advantage. One of the key challenges is the low level of consumer trust in online real estate platforms. Due to the prevalence of misinformation, fake listings, and lack of verification mechanisms, buyers often hesitate to rely on digital sources when making high-stakes decisions like purchasing property. In many cases, the absence of regulatory oversight and transparency in online listings leads to confusion, distrust, and skepticism among potential buyers. Moreover, consumers frequently encounter difficulties in verifying the legitimacy of agents and the authenticity of advertised properties, which further exacerbates their reluctance to engage in online transactions (Wahiduzzaman, 2023). In addition to these trust-related issues, digital literacy remains a significant barrier for both buyers and sellers in many parts of the country. While internet penetration and smartphone usage are rising rapidly, a considerable portion of the population still lacks the necessary digital skills to navigate online platforms confidently and securely. This digital divide creates disparities in access to real estate opportunities and limits the effectiveness of digital marketing campaigns. Companies often invest in digital advertising without a clear understanding of their audience's readiness or capacity to engage with such content, leading to inefficient campaigns and low return on investment.

Social media platforms like Facebook, Instagram, and YouTube are widely used in real estate marketing for their visual appeal, interactivity, and ability to target specific demographics. However, the actual influence of social media content such as property showcases, client testimonials, influencer partnerships, and targeted ads on shaping consumer perceptions, trust, and decision-making remains underexplored in the Bangladeshi context. Questions arise about what types of content resonate most with consumers, how social interactions affect purchase intent, and whether engagement metrics translate into real sales conversions. Similarly, affiliate marketing, an increasingly popular strategy in digital marketing, offers the potential to expand market reach and build trust through third-party recommendations. Yet, the role of affiliate marketers, such as independent agents, influencers, bloggers, and property consultants, in influencing buyer behavior and driving transactions has not been systematically studied in the context of Bangladesh's real estate sector. It is unclear whether consumers trust recommendations from affiliate sources, how commission structures affect promotional authenticity, and what role affiliates play in converting interest into purchase.

E-marketing tools, including real estate websites, mobile apps, email newsletters, and virtual tours, have become essential for providing property information and facilitating digital transactions. These platforms offer convenience, accessibility, and often reduce the time and cost associated with traditional property search methods. However, the actual impact of e-marketing tools on consumer behavior, particularly in terms of decision-making efficiency, satisfaction with the buying experience, and final purchasing outcomes is yet to be fully understood. Many consumers still face challenges with platform usability, responsiveness, and integration of support services such as legal advice,

financial tools, and customer service. Considering these issues, this research aims to address the multidimensional gap by thoroughly investigating how social media, affiliate marketing, and e-marketing collectively influence consumer purchasing decisions in the real estate sector of Bangladesh. The study will explore how each of these digital tools contributes to shaping consumer perceptions, building trust, enhancing convenience, and ultimately leading to purchase decisions. By analyzing the interplay between these elements, this study seeks to offer a holistic perspective on the effectiveness of digital marketing in the real estate industry and provide actionable insights for businesses, marketers, and policymakers striving to modernize the sector in alignment with consumer expectations and digital trends.

### Research Questions

- i. To what extent do social media platforms influence consumer purchasing decisions among real estate buyers in Bangladesh?
- ii. What is the impact of affiliate marketing on consumer purchasing decisions in the real estate sector of Bangladesh?
- iii. How do e-marketing platforms influence consumer purchasing decisions in the real estate market of Bangladesh?

### Objectives of the Study

The primary objective of this study is to explore the role of social media, affiliate marketing, and e-marketing in influencing consumer purchasing decision in the real estate sector of Bangladesh. The specific objectives are as follows:

- I. To examine the influence of social media platforms on consumer purchasing decisions within the real estate market of Bangladesh.
- II. To evaluate the impact of affiliate marketing strategies on consumer purchasing decisions in the Bangladeshi real estate sector.
- III. To investigate how e-marketing platforms affect on purchasing decisions in the real estate market of Bangladesh.

These objectives provide a structured framework for the study and contribute to understanding how digital tools can enhance the real estate industry's efficiency, transparency, and consumer satisfaction in Bangladesh.

### Significance of this study

This paper holds substantial value for a diverse range of stakeholders within the real estate ecosystem in Bangladesh, including developers, marketers, policymakers, digital platforms, and academic researchers. In an era where digital transformation is reshaping consumer behavior and business operations across industries, the real estate sector traditionally reliant on face-to-face interactions and offline marketing must adapt to the changing landscape. This research provides comprehensive, data-driven insights into how digital marketing tools specifically social media, affiliate marketing, and e-marketing affect consumer purchasing decisions in the Bangladeshi context. By examining buyer behavior in relation to these platforms, the study aims to uncover the key motivators, preferences, and trust factors that influence how consumers search for, evaluate, and ultimately invest in real estate properties. For real estate developers and marketers, the findings of this study offer practical guidance on optimizing digital marketing strategies. Understanding which platforms and content types are most effective in engaging potential buyers can lead to better resource allocation, higher lead conversion rates, and more impactful brand positioning. Developers will be able to fine-tune their marketing approaches to resonate with digitally savvy audiences, while also identifying gaps in current promotional practices that may be limiting their market reach. For marketing professionals, the study serves as a blueprint for designing targeted campaigns that align with consumer behavior trends, preferences, and expectations thus improving customer acquisition and retention in a competitive and fast-evolving market. From a policy perspective, the insights generated by this study are equally valuable. As online property listings, virtual tours, and digital transactions become more commonplace, there is an urgent need for regulatory frameworks that ensure transparency, data protection, and consumer rights in the digital real estate space. Policymakers can use research findings to design informed policies that promote ethical practices, secure transactions, and a more trustworthy online marketplace. Additionally, the study can help identify areas where government support or intervention is necessary, such as improving digital literacy, standardizing online real estate platforms, or implementing safeguards against misinformation and fraud. Academically, this study fills a significant gap in existing literature by



focusing on the intersection of digital marketing and real estate in a developing country setting. While studies in more advanced economies have explored these themes extensively, there is limited empirical research examining how these marketing tools influence property buyers in emerging markets like Bangladesh. The unique socio-economic, cultural, and technological context of the country presents a fertile ground for exploration, and the outcomes of this study offer a foundational understanding upon which future research can build. Scholars and students interested in digital marketing, consumer behavior, and urban development can benefit from the conceptual frameworks, methodologies, and findings presented in this work.

### **Scope of the Study**

This study is primarily focused on exploring the influence of digital marketing tools on consumer purchasing decisions in the urban real estate markets of Bangladesh, with particular emphasis on three major cities Dhaka, Chattogram, and Sylhet where the adoption of digital platforms is most prominent. These urban centers represent the most active and digitally engaged segments of the country's real estate sector, making them ideal for understanding the intersection between marketing technology and consumer behavior. The study investigates the role of social media platforms, specifically Facebook, Instagram, and YouTube, as these are the most widely used and influential channels for promoting real estate properties, generating leads, and engaging potential buyers through visual content, virtual tours, live interactions, and targeted advertising. In addition to social media, the research delves into the growing significance of affiliate marketing strategies, which include the use of influencers, bloggers, and referral-based programs to expand brand visibility and build consumer trust. These affiliate networks are becoming increasingly vital in the Bangladeshi context, where consumers often rely on peer recommendations and third-party endorsements when making high-value decisions like purchasing property. The study evaluates how these affiliate marketing efforts contribute to buyer awareness, trust formation, and purchase intent. Furthermore, the scope encompasses e-marketing platforms, including real estate listing websites, mobile apps, virtual tour tools, and integrated online payment systems. These platforms are analyzed in terms of how they enhance accessibility, provide comprehensive property information, and facilitate smoother transaction processes for buyers. The study specifically targets three key stakeholder groups: real estate buyers, developers, and digital marketing professionals. By examining their experiences, behaviors, and interactions with these digital marketing tools, the research aims to offer a holistic understanding of the digital influence on real estate purchasing decisions in the evolving urban landscape of Bangladesh.

### **LITERATURE REVIEW**

The real estate sector in Bangladesh has undergone significant transformation in recent years, driven by rapid urbanization, rising middle-class income, and increased access to digital technologies. Alongside this growth, the marketing strategies used to attract potential buyers have also evolved. Traditional methods such as newspaper advertisements, billboards, and personal referrals are gradually being complemented and, in some cases, replaced by digital marketing tools. In particular, social media platforms, affiliate marketing systems, and e-marketing strategies have emerged as powerful channels to reach and influence today's tech-savvy consumers. Digital marketing has fundamentally changed how real estate developers and agencies interact with potential buyers. Consumers now rely heavily on online sources for property information, virtual tours, customer reviews, and price comparisons before making purchasing decisions. The role of digital marketing, therefore, is not merely promotional it directly shapes consumer perceptions, trust, and purchase intentions. Among the various digital tools, social media stands out as a platform for two-way communication and community engagement, which allows real estate brands to build trust and establish emotional connections with potential buyers. Affiliate marketing, though less explored in the real estate sector, offers performance-based promotion models where third parties (such as influencers or property portals) drive traffic and leads. Meanwhile, e-marketing tools including email campaigns, SEO, pay-per-click ads, and digital listing platforms enable real-time information sharing, targeted outreach, and personalized content delivery. Despite the global growth in digital real estate marketing, empirical studies specifically focusing on the Bangladeshi real estate market remain scarce. Cultural, economic, and technological dynamics in Bangladesh present a unique setting for studying how consumers respond to these digital marketing channels. Given the increasing reliance on digital platforms by both buyers and sellers in urban centers like Dhaka, Chattogram, and Sylhet, it becomes essential to examine the real impact of these tools on consumer

decision-making. This chapter reviews the existing literature related to the three core digital marketing channels addressed in this study social media, affiliate marketing, and e-marketing. It aims to establish a theoretical foundation for understanding how these tools influence consumer purchasing decisions in the real estate context and highlights the research gaps that justify this study's relevance and necessity.

### **Social Media Marketing**

Social media has transformed from a simple platform for social interaction to a powerful marketing tool that influences consumer behavior across various industries including real estate. As of 2024, Bangladesh has over 50 million active social media users, with platforms like Facebook, YouTube, Instagram, and WhatsApp playing a central role in how people communicate, gather information, and make purchase decisions. In the context of real estate, where purchasing a property involves significant financial and emotional investment, social media acts as a critical channel for influencing buyer perceptions, trust, and final decisions. Social media enables two-way communication, allowing real estate companies to not only broadcast their offerings but also interact with potential buyers in real time. According to Mangold and Faulds (2009), social media serves as a hybrid component of the promotional mix because it integrates both firm-generated and user-generated content. Buyers can engage with promotional materials, ask questions, view customer reviews, and interact with past clients all of which reduce uncertainty and facilitate trust-building. In real estate, visual content plays a crucial role in shaping consumer perception. Platforms like Facebook and Instagram allow developers to share: High-resolution images and videos of properties, 360-degree virtual tours, Live Q&A sessions or webinars with property agents, Customer testimonials and success stories. These formats give potential buyers a realistic view of properties without needing to visit them physically, which is especially useful in a congested and time-constrained urban environment like Dhaka. Kaplan & Haenlein (2010) emphasize that the rich media features of social platforms significantly enhance user engagement, particularly in industries where visual appeal and physical inspection are key decision factors. Studies have shown that peer influence on social media can significantly affect purchasing behavior. When individuals see their peers liking, sharing, or commenting on real estate posts, they are more likely to perceive the property as trustworthy and consider it seriously. This aligns with the Social Proof Theory, which suggests that people often rely on the behavior and opinions of others when making decisions in uncertain environments. For instance, a Facebook review from a recent buyer praising a property's location or developer's reliability can weigh more heavily than a paid advertisement.

In Bangladesh, real estate developers and agents increasingly rely on Facebook Ads, sponsored posts, and interactive content to capture the attention of middle and upper-middle-class buyers. A study by Hossain and Rahman (2021) found that over 70% of property buyers in Dhaka used social media as part of their information search process. Moreover, platforms like YouTube are now being used for long-form content such as virtual project walkthroughs and expert interviews, which offer in-depth insights to buyers. Social media also enables targeted marketing through demographic, geographic, and behavioral filters. Developers can reach specific customer segments such as young professionals looking for affordable flats or families seeking larger apartments in suburban areas. This level of precision allows for more efficient marketing spending and higher conversion rates. However, despite its effectiveness, there are challenges: Content fatigue due to oversaturation of promotional posts, Lack of credibility in sponsored content if not backed by real testimonials, Limited reach among older demographics or those without internet access. Nevertheless, the overall impact of social media on real estate purchasing decisions is profound. It enables greater transparency, enhances communication, and builds trust three critical elements in a high-stakes decision like property buying.

### **Affiliate Marketing**

Affiliate marketing is a performance-based digital marketing strategy in which businesses reward third-party affiliates such as bloggers, influencers, or websites for generating traffic or sales through their promotional efforts. While affiliate marketing is most commonly associated with industries like e-commerce, fashion, and technology, its application in the real estate sector is gaining traction, particularly in developing markets like Bangladesh where online consumer engagement is growing rapidly. Affiliate marketing operates on the principle of trust and influence. Affiliates act as intermediaries between a business and its potential customers. According to Duffy (2005), affiliates can increase consumer trust because they are perceived as more objective and independent

compared to direct advertisements. In the context of real estate, a high-involvement purchase decision that requires careful consideration this trust becomes especially critical. Prospective buyers are more likely to be influenced by recommendations from perceived experts or reputable digital platforms than by traditional marketing tactics alone. In real estate, affiliates can take various forms: Property listing websites that host third-party listings for developers and brokers, Social media influencers who promote real estate projects to their audience, Real estate bloggers or vloggers who review properties and provide expert opinions, Lead generation platforms that collect consumer data and forward it to real estate businesses. The use of affiliate partnerships enables real estate companies to expand their reach to niche audiences without directly managing every aspect of the marketing campaign. For example, a developer might partner with a lifestyle blogger whose audience includes urban middle-class professionals the exact demographic likely to be purchasing apartments in Dhaka. The affiliate promotes the developer's project and earns a commission for every qualified lead or sale that originates through their content. Research by Charlesworth (2018) emphasizes that affiliate marketing not only increases visibility but also enhances credibility, especially for high-cost products and services like real estate. This is because affiliates often produce in-depth reviews, videos, or tutorials that educate consumers thus supporting informed decision-making. The perceived objectivity and expertise of affiliates make their recommendations more persuasive than direct ads.

In the Bangladeshi context, this form of marketing is still emerging but shows strong potential. Platforms such as Bproperty.com, pbazaar.com, and others have begun to implement affiliate-style programs where agents, websites, or digital influencers refer leads in exchange for commissions. A study by Ahmed & Mahmud (2022) notes that local consumers often place greater trust in third-party recommendations and online property portals than in traditional sales agents. Moreover, as more consumers turn to online research before making purchasing decisions, the value of affiliate-driven content and leads continues to rise. However, there are still challenges to be addressed. These include: A lack of transparency in tracking affiliate performance, Limited awareness among real estate developers about affiliate marketing's strategic value, Regulatory or ethical concerns related to commission-based sales. Despite these challenges, the predictive power of affiliate marketing in influencing buyer decisions particularly among younger, internet-savvy demographics is becoming increasingly evident.

### **E-Marketing**

E-marketing, or electronic marketing, refers to the strategic use of digital technologies and internet-based platforms to promote products and services. In the context of real estate, e-marketing encompasses a broad array of tools and techniques including email marketing, search engine optimization (SEO), paid advertising (PPC/Google Ads), real estate websites, mobile apps, and online customer service systems. These tools collectively offer an efficient, scalable, and cost-effective way to engage prospective buyers, deliver timely information, and influence purchasing decisions. According to Chaffey and Ellis-Chadwick (2016), e-marketing is defined as "achieving marketing objectives through the application of digital technologies and media." It allows real estate developers to reach targeted segments, maintain constant communication, personalize messages, and measure campaign performance in real time. Unlike traditional marketing methods, e-marketing enables direct access to consumer behavior data such as click-through rates, time spent on property pages, and inquiry conversions providing deeper insights into buyer preferences and intent.

For real estate, where buyers typically engage in lengthy and complex decision-making processes, e-marketing serves as a relationship-building tool. Websites, mobile apps, and email campaigns offer a platform for delivering: Detailed property descriptions and virtual tours, Loan and EMI calculators, Location maps and neighborhood insights, Real-time chat or call-back support. This information helps potential buyers make more informed decisions without the need for repeated physical visits or manual document exchanges. E-marketing significantly influences consumer behavior by offering convenience, customization, and control. According to Strauss and Frost (2014), digital marketing tools help reduce information asymmetry, which is particularly important in high-investment decisions like buying property. Buyers are now more empowered to compare prices, analyze locations, read online reviews, and even verify the reputation of developers—all before contacting a sales agent.

In Bangladesh, the increasing availability of online property portals such as Bproperty.com, pbazaar.com, and Lamudi has made real estate more accessible and transparent. A study by Hossain et al. (2020) found that more than 60% of urban property seekers use online platforms as their primary source of information, especially in cities like Dhaka, Chattogram, and Sylhet. These platforms offer search filters based on budget, location, amenities, and property type allowing consumers to narrow down choices based on their exact needs. Furthermore, email marketing and retargeting ads are used to re-engage potential buyers who have shown interest in specific properties or locations. These tools help real estate marketers stay in front of prospects over time, subtly nudging them toward a purchase decision. With the widespread use of smartphones and affordable internet packages, e-marketing in Bangladesh has become increasingly mobile-first. Many real estate developers and platforms now offer mobile-optimized websites and apps that allow users to browse listings, save favorites, and request callbacks instantly. This shift to mobile access is especially crucial in reaching working professionals and younger buyers who rely on digital channels during commute or work breaks. Localized content and Bangla-language interfaces also help widen access to non-English-speaking consumers, enhancing inclusivity and trust. Developers that invest in localized SEO (e.g., using keywords in Bangla) are more likely to appear in local search results, increasing visibility and click-through rates. Despite its numerous advantages, e-marketing in the Bangladeshi real estate sector faces several limitations: Digital literacy gaps in semi-urban and rural populations, Data privacy concerns associated with online forms and inquiries, Lack of automation and integration in some firms' digital ecosystems, Limited personalization due to generic content strategies. Nevertheless, the overall direction indicates strong growth and increasing dependence on e-marketing tools to influence and facilitate real estate transactions.

### **Integration of Digital Marketing Channels in Real Estate**

In the modern marketing landscape, integration of digital marketing channels—such as social media, affiliate marketing, and e-marketing—is not just beneficial but essential for achieving strategic success, especially in high-investment sectors like real estate. These channels, when deployed in a coordinated manner, amplify the reach, credibility, and influence of marketing campaigns and provide a seamless consumer experience across multiple touchpoints.

Integrated digital marketing refers to the harmonization of various online tools and platforms to deliver consistent messaging, reinforce brand identity, and guide consumers smoothly along the purchasing journey. Instead of operating in silos, social media, email marketing, SEO, affiliate programs, and real estate portals are interlinked to support one another. According to Kotler and Keller (2016), integrated marketing communications ensure that "all forms of communications and messages are carefully linked together," strengthening overall brand impact and reducing confusion for potential buyers. For example, a real estate company may: Use Facebook Ads to attract attention to a new housing project, Direct users to a landing page with detailed property information, Capture leads via a sign-up form, Nurture those leads through automated email campaigns, and Encourage external bloggers or affiliates to publish reviews and drive additional traffic. Such an integrated approach creates multiple reinforcement points, increasing the likelihood of conversion and ensuring that consumers stay engaged at every stage of the buyer's journey.

### **Synergy Between Social Media, Affiliate Marketing, and E-Marketing**

Social media excels at brand awareness and engagement. It is often the first point of contact where consumers discover real estate projects, ask questions, and develop trust through peer interactions. Moreover, Affiliate marketing adds third-party credibility. Influencers, bloggers, or property platforms recommend projects to their audiences, acting as intermediaries that validate a developer's claims and drive high-intent traffic. Besides, E-marketing tools such as email campaigns, PPC advertising, and real estate portals facilitate lead conversion by providing personalized content, in-depth property details, virtual tours, and instant communication options. When these channels are integrated, they create a cohesive buyer journey from awareness to interest, evaluation, and final decision-making. For instance, a consumer who first encounters a property on Instagram may later receive a review through an affiliate's blog, followed by a targeted email with a price offer all reinforcing the same core value proposition.

### **Benefits of Integration in the Real Estate Sector**

In the real estate context, integrated digital marketing offers several key benefits: Improved lead quality through multi-touch engagement, Increased trust and transparency due to consistent messaging across platforms, Higher conversion rates as buyers receive the right message at the right



time, Enhanced data tracking and analytics, allowing marketers to understand which channels are most effective, Cost efficiency, since integrated campaigns often reduce duplicated efforts. A study by Habib and Hossain (2022) found that integrated marketing strategies led to a 25% higher conversion rate for real estate firms in Dhaka compared to those using isolated digital tactics. This supports the idea that synergy among channels increases not only visibility but also buyer readiness.

### **Relevance in the Bangladeshi Context**

In Bangladesh, digital marketing in real estate is still evolving, but there's a clear trend toward integration. Major developers and platforms are beginning to unify their social media presence, digital advertising, and lead generation efforts. For instance: Companies like Bproperty.com link their Facebook promotions with email follow-ups and mobile app engagement, Local developers often collaborate with influencers or listing sites and then retarget interested users with personalized content via email or WhatsApp. Given the growing reliance on mobile devices and social media in Bangladesh, integrated campaigns ensure that potential buyers remain connected across different digital environments, increasing the probability of eventual purchase.

### **Research Gap**

Despite the rapid digitization of marketing practices in the global real estate industry, there remains a significant lack of contextual and empirical research in the Bangladeshi setting. Most of the existing literature focuses on digital marketing's role in consumer goods and services in developed markets, with limited application to high-involvement sectors like real estate in developing countries. While digital marketing tools are increasingly being used in Bangladesh's real estate sector, there is little academic evidence evaluating their effectiveness in influencing buyer behavior. Prior studies, such as those by Chaffey and Ellis-Chadwick (2016), focus primarily on digital marketing in Western contexts, which differ significantly in consumer behavior, infrastructure, and market maturity. The absence of locally grounded studies creates a gap in understanding how Bangladeshi consumers interact with digital channels during property purchasing.

Most existing research explores digital marketing tools such as social media, affiliate marketing, or email campaigns in isolation. Few studies examine how these channels work together in an integrated fashion to guide consumers along the purchasing journey (Kotler & Keller, 2016). This fragmentation hinders marketers' ability to develop unified strategies that resonate with prospective property buyers. While numerous studies report on click-through rates and online impressions, fewer explore the psychological and decision-making mechanisms influenced by digital marketing in the real estate context. Questions regarding consumer trust in social media content, the perceived credibility of affiliate recommendations, and buyer responsiveness to e-marketing remain underexplored in the Bangladeshi setting (Strauss & Frost, 2014). There is a noticeable scarcity of empirical models that measure the impact of integrated digital marketing channels on real estate buying behavior in Bangladesh. Although anecdotal evidence suggests that online visibility and influencer endorsements play a role, few studies apply robust statistical models such as regression analysis to quantify these effects (Habib & Hossain, 2022). As Bangladesh experiences increased urbanization and smartphone usage, consumer reliance on digital platforms for property-related decisions continues to grow. However, academic research has not kept pace with these trends, leaving a knowledge gap about how emerging digital habits are influencing buyer behavior in urban real estate markets (Hossain et al., 2020).

### **Research Hypostudy**

The real estate sector in Bangladesh has witnessed significant digital transformation, with online marketing strategies playing a crucial role in influencing consumer purchasing decisions. Among these strategies, social media marketing, affiliate marketing, and e-marketing have emerged as essential tools for engaging potential buyers, building brand credibility, and driving sales. Social media marketing refers to utilizing social media and online communities to raise brand awareness through markets efforts, enabling businesses to reach a broader market (Zanjabila et al., 2023). According to Gunelius (2011), social media marketing consists of four indicators: content creation, content sharing, connecting, and community building. Research by Taan et al. (2021) and Adiningtyas & Hasanah (2023) indicates a positive and significant impact of social media marketing on consumer purchasing decision. Meanwhile, Marliya & Tafiprios (2023) found that while social media marketing does not directly impact brand image significantly, well-executed social media marketing focusing on creating a positive brand image can significantly influence purchase decisions. Additional studies indicate that social media marketing has a significant effect on

purchasing decision, particularly when supported by a strong brand image (Narayana & Rahanatha, 2020).

Affiliate marketing is an online promotion strategy where individuals earn a commission or income each time they successfully sell a product they promote through an affiliate link, sharing it across various platforms (Adriana & Syaefulloh, 2023). According to Lumban Batu, affiliate marketing is a collaboration between organizations and companies aimed at achieving mutual benefits through agreements to promote products (Susanto, 2022). The process of affiliate marketing starts when an affiliate publishes an affiliate link in an attempt to direct possible customers to a company's website or online store. After this, customers click affiliate links which create online foot traffic to the company's website, and purchase a product to complete the sale. Affiliate marketer receives a commission for every purchase made through the affiliate link published online (Dwivedi et al., 2017). There are different types of commissions in affiliate marketing, one of which is the cost per sale (CPS) and pay per sale (PPS), wherein the affiliate marketer is compensated based on the number of sales generated by the advertisement (Dwivedi et al., 2017).

Out of all the different types of digital marketing, affiliate marketing yields the most engagement between the consumers and the products. A study by Fahim (2020), showed that affiliate marketing helped consumers be more aware of a business' product. In fact, the participants in the study's survey revealed that engaging with affiliate ads and vlogs had increased their trust in a company's brand statement, and it encouraged them to buy their products.

Affiliate marketing has helped to improve certain factors regarding consumers considering the products they consume. Through affiliate marketing, product value is increased with a decreased risk factor, and this type of marketing also improves customers' feedback and brand awareness, hence why affiliate marketing is one of the known marketing strategies that is known in e-commerce (Ghosal et al. 2021). Across many studies, Affiliate Marketing is represented as a cost-effective and fastest-growing e-commerce marketing strategy to increase sales. Not only that, but it is also said that affiliate marketing has a major effect on three vital sectors in a company: cost of advertisements, product visibility, and Return on Investment (ROI) (Patrick & Hee, 2019). The same goes for the study by Suresh et al. (2018); affiliate marketing provides a win-win relationship between the parties involved in each transaction, the company or brand, the affiliate or marketer, and the consumers.

E-Marketing has brought about substantial changes in consumer purchasing decision throughout numerous sectors, particularly affecting the book industry. Recently, a significant amount of scholarly research has been devoted to examining the impact of e-marketing strategies on consumers' purchasing patterns, focusing on younger age groups like university students. In examining the impact of digital marketing strategies on consumer behavior, Chi et al. (2014) evaluate online book purchase intentions among Malaysians aged 20-37. The study found that characteristics, including brand name, convenience, and product diversity, were the most important factors that influence consumer purchase intentions. The provided insight holds significant value for online book merchants targeting Generation Y. According to Khan and Islam (2017), digital marketing plays a crucial role in cultivating customer loyalty. In a competitive market, identifying value-added qualities, content quality, customer service, and a constant online presence is essential for acquiring and retaining clients. This is done through exploratory factor analysis (Islam & Bhuiyan, 2022). E-marketing, utilizing digital technology, namely the Internet, plays a crucial role in establishing connections between businesses and customers (Eid & El-Gohary, 2013). There has been a lot of academic work recently focused on studying how e-marketing influences customer behavior, particularly on Daraz.com.bd, a major e-commerce site in Bangladesh. This literature review investigates the variety of factors that impact online shopping behavior and purchase choices of consumer.

According to Kotler (2012), "Purchasing decisions are the actions of consumers to buy or not buy a product." According to Fandy Tjiptono (2014), "purchasing decisions are a process where consumers recognize the problem, look for information about a particular product or brand, and evaluate how well each alternative can solve the problem, which then leads to a purchasing decision." According to (Daulay & Putri, 2018) "a consumer decision is an action taken by a consumer to buy a product. Every manufacturer must implement various strategies so that consumers decide to buy their products. Before making a purchasing decision, consumers first go through several stages to arrive at a purchasing decision, namely the step-by-step process that consumers use when purchasing goods or services. Furthermore, purchasing decisions according to (Fahmi, 2016) are "consumer

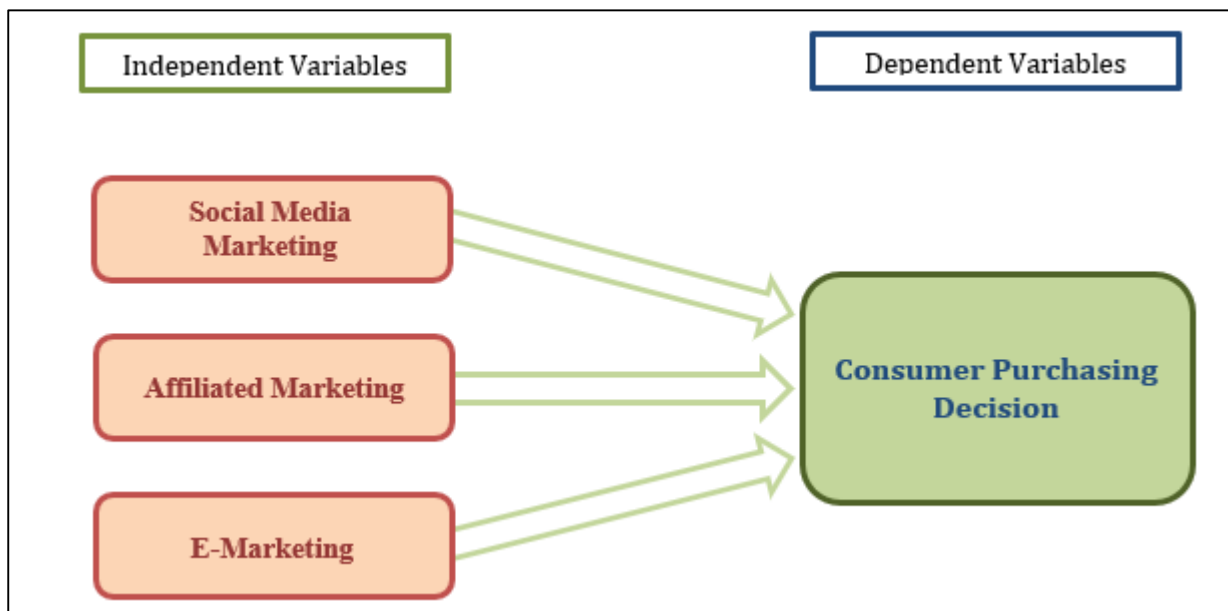
actions in deciding on a product that is considered to be the solution to the consumer's needs and desires". The purchasing decision is the most important thing. This is the end of a series of purchasing processes (Kotler & Keller, 2016). After various stimuli are carried out, customers will choose to shop in e-commerce according to their final choice (Suleman et al., 2020). It is said that purchasing decisions are closely related to customer behavior. Customer behavior in purchasing decisions exists because at this stage the decision-making process is carried out by the customer (Kotler & Keller, 2012). According to Torabi (2022), online purchasing decisions are Impacted by the completeness of information and risk-taking using an online media approach. Online purchasing decisions are also Impacted by discounts offered on websites (Kim & Tanford, 2021). To analyze the role of social media marketing, affiliate marketing, and e-marketing in the real estate sector of Bangladesh, the following research hypotheses are proposed:

**H1:** Social media marketing has a significant impact on consumer purchasing decisions in the real estate sector of Bangladesh.

**H2:** Affiliate marketing plays a crucial role in driving real estate sales in Bangladesh.

**H3:** E-marketing platforms significantly influence consumer behavior & purchasing decisions in the real estate sector of Bangladesh.

**Figure 1: Conceptual framework for this study**



## METHOD

This study employs a quantitative research approach to systematically examine the influence of social media, affiliate marketing, and e-marketing on consumer purchasing decisions within the real estate sector of Bangladesh. The methodology is designed to combine descriptive and explanatory elements, enabling the profiling of consumer attitudes and engagement while also establishing causal linkages between digital marketing strategies and purchasing intentions. A structured survey instrument, guided by the research objectives and theoretical framework, serves as the primary tool for data collection. The questionnaire, based on a 5-point Likert scale, measures consumer perceptions of social media campaigns, the effectiveness of affiliate marketing initiatives, and the impact of e-marketing platforms such as real estate websites and virtual property tours. To strengthen the reliability and validity of the instrument, content validation was carried out through expert review, followed by a pilot test with 30 respondents. Cronbach's Alpha values exceeding 0.7 across major constructs confirmed internal consistency. The research targets three major respondent groups—real estate buyers, developers and marketers, and digital marketing professionals—to ensure a comprehensive exploration of both consumer behavior and industry perspectives. A stratified random sampling method was adopted to balance representation, with 70% of respondents drawn from buyers, 20% from developers and marketers, and 10% from digital marketing professionals. A total of 406 respondents were surveyed, a sample size that exceeds Krejcie and Morgan's (1970)

recommendation for populations over 100,000, ensuring robust statistical power and representativeness across urban centers such as Dhaka, Chattogram, and Sylhet.

Primary and secondary data sources were employed to capture both consumer-driven and institutional perspectives. Primary data was collected through online surveys distributed via Google Forms across platforms like Facebook, WhatsApp, and email, as well as through in-person interviews with real estate professionals affiliated with leading companies such as GM Holdings Limited, Eastern Housing Limited, and Concord Real Estate. This dual approach provided quantifiable consumer insights alongside qualitative context from industry practitioners. Interviews with developers, marketers, and property consultants allowed the study to document first-hand accounts of digital marketing practices, challenges, and consumer interactions. Complementary secondary data was gathered from company reports, marketing materials, and publications from the Real Estate and Housing Association of Bangladesh (REHAB), as well as government agencies such as the Bangladesh Telecommunication Regulatory Commission (BTRC) and Bangladesh Bank. These sources offered critical context on internet penetration, mobile usage, digital payment adoption, and broader real estate market dynamics. Ethical considerations were strictly maintained throughout the research process: participants gave informed consent, their anonymity was protected, and participation was voluntary, with respondents having the option to withdraw at any stage. No personal identifiers were recorded, ensuring compliance with academic standards for ethical research conduct.

Data analysis was carried out using SPSS Version 29 alongside Microsoft Excel for visualization. The analysis followed a multi-stage approach beginning with descriptive statistics (mean, standard deviation, frequency distribution) to summarize demographic characteristics and provide a general overview of consumer perceptions. To explore relationships between variables, Pearson's correlation was used to measure the strength and direction of associations between digital marketing activities and consumer purchasing decisions. To test hypotheses, regression models and inferential tests were applied: simple linear regression assessed the impact of social media on purchasing behavior, while independent T-tests evaluated differences in consumer responses to affiliate marketing exposure. Multiple regression models were employed to analyze the combined influence of various e-marketing tools, such as website usability, online payment systems, and virtual property tours, on purchase intention. Additionally, ANOVA tests were used to detect differences across demographic groups, such as whether younger buyers were more influenced by social media or whether income levels moderated the impact of affiliate promotions. The inclusion of both descriptive and inferential statistics ensured a rigorous and comprehensive evaluation of the data. Together, this methodological framework provides a robust foundation for investigating how social media, affiliate marketing, and e-marketing shape consumer purchasing decisions in Bangladesh's evolving real estate industry.

## FINDINGS

The study gathered data from 406 real estate buyers across Bangladesh to explore how social media, affiliate marketing, and e-marketing influence their purchasing decisions. The demographic analysis focused on key variables including age, gender, occupation, and monthly income. Most respondents (43.84%) were aged 25–35, followed by 38.42% in the 36–45 age group, reflecting that real estate buyers are predominantly young to middle-aged professionals. In terms of gender, a significant majority were male (84.24%), indicating that men are more actively involved in property purchasing decisions. When it comes to occupation, most respondents were employed in the private sector (63.55%), while business owners made up 24.14%, suggesting that working professionals are the primary target group for real estate marketing. Regarding monthly income, more than half (53.69%) reported earnings of below BDT 100,000, which highlights affordability as a key factor influencing purchasing behavior. Overall, the demographic profile shows that Bangladesh's real estate market is driven by middle-income, working-age males, which provides useful context for understanding digital marketing's role in shaping their buying choices.



**Figure 2: Demographic Profile of Respondents**

Demographic Factor	Category	Frequency (n=406)	Percentage (%)
<b>Age</b>	Below 25	12	2.96%
	25 – 35	178	43.84%
	36 – 45	156	38.42%
	46 – 55	52	12.81%
	56 and above	8	1.97%
<b>Gender</b>	Male	342	84.24%
	Female	64	15.76%
<b>Occupation</b>	Private Service	258	63.55%
	Business	98	24.14%
	Govt. Service	18	4.43%
	Freelancer	12	2.96%
	Home Maker	12	2.96%
	Others	8	1.97%
<b>Monthly Income (BDT)</b>	Below 100,000	218	53.69%
	150,000 – 250,000	126	31.03%
	250,000 – 350,000	46	11.33%
	Above 350,000	16	3.94%

**Descriptive Analysis of Key Variables**

The descriptive statistics provide important insights into the role of digital marketing tools—namely social media, affiliate marketing, and e-marketing—in shaping consumer purchasing decisions in the Bangladeshi real estate sector. Social media emerged as the most influential platform, with respondents reporting frequent exposure to real estate advertisements on platforms such as Facebook, Instagram, and YouTube ( $M = 3.92$ ,  $SD = 0.87$ ). Additionally, 61% of participants indicated that they actively follow real estate pages or influencers, reflecting strong consumer interaction with property-related content. The perceived influence of social media was particularly notable, with a high mean score of 4.12 ( $SD = 0.76$ ), suggesting that it not only raises awareness but also significantly shapes perceptions, preferences, and purchase intentions. Affiliate marketing, though moderately less impactful, also plays a growing role in influencing buyer behavior. Familiarity with affiliate promotions was reported by 54% of respondents ( $M = 0.54$ ,  $SD = 0.50$ ), while 40% acknowledged clicking on affiliate links ( $M = 0.40$ ,  $SD = 0.49$ ). The level of trust in affiliate marketers received a mean of 3.24 ( $SD = 1.02$ ), while their overall influence on purchasing decisions was moderate ( $M = 3.45$ ,  $SD = 0.94$ ). These findings highlight that affiliate marketing strategies, though still developing in Bangladesh, hold potential for influencing buyer decisions if trust-building and engagement efforts are enhanced.

E-marketing strategies, including property websites, virtual tours, and online payment options, were also found to significantly shape buyer behavior. Respondents reported a moderately high frequency of browsing property listings online ( $M = 2.75$ ,  $SD = 1.08$ ), confirming that digital platforms are essential tools in the property search process. However, only 15% expressed willingness to purchase without a physical site visit ( $M = 0.15$ ,  $SD = 0.36$ ), demonstrating that while digital channels assist in discovery and shortlisting, physical inspections remain a critical step before finalizing transactions. Despite this limitation, the overall influence of e-marketing on purchasing decisions was reported as strong, with a mean of 4.02 ( $SD = 0.82$ ). This finding underscores the critical role of e-marketing in shaping buyer perceptions, enhancing confidence through detailed online property information, and providing convenient transaction pathways. Taken together, these results illustrate that social media leads as the most persuasive digital marketing tool in the real estate sector, affiliate marketing holds promising potential, and e-marketing reinforces buyer confidence, thereby collectively influencing consumer purchasing decisions in Bangladesh's real estate market.

**Reliability and Validity Analysis**

The reliability and validity analyses confirmed that the measurement instrument used in this study was both consistent and accurate in capturing the intended constructs of social media influence, affiliate marketing influence, and e-marketing influence on consumer purchasing decisions within the real estate sector of Bangladesh. Reliability was assessed using Cronbach's Alpha, where all constructs exceeded the recommended threshold of 0.70, indicating good to high internal consistency (Social Media Influence:  $\alpha = 0.82$ ; Affiliate Marketing Influence:  $\alpha = 0.78$ ; E-Marketing Influence:  $\alpha = 0.85$ ). Validity was established through content validity checks, involving expert reviews

and pilot testing, as well as construct validity using Exploratory Factor Analysis (EFA) with PCA and Varimax rotation. The Kaiser-Meyer-Olkin (KMO) values (0.81, 0.78, and 0.84) and significant Bartlett's Test results ( $p = 0.000$  for all constructs) confirmed data adequacy for factor analysis, while the variance explained exceeded the 60% benchmark (72.4%, 68.9%, and 75.1% respectively), affirming the robustness of the instrument. These results collectively establish that the survey instrument is statistically reliable and valid, ensuring credible and trustworthy findings for further analysis.

**Figure 3: Reliability and Validity Analysis for this study**

Construct	No. of Items	Cronbach's Alpha ( $\alpha$ )	Interpretation	KMO Value	Bartlett's Test (p-value)	Variance Explained (%)
Social Media Influence	5	0.82	High Reliability	0.81	0.000 (Sig.)	72.4%
Affiliate Marketing Influence	4	0.78	Good Reliability	0.78	0.000 (Sig.)	68.9%
E-Marketing Influence	6	0.85	High Reliability	0.84	0.000 (Sig.)	75.1%

### Pearson Correlation Analysis

The Pearson correlation analysis demonstrated that social media influence ( $r = 0.71$ ,  $p < 0.01$ ), affiliate marketing influence ( $r = 0.65$ ,  $p < 0.01$ ), and e-marketing influence ( $r = 0.68$ ,  $p < 0.01$ ) all have strong, positive, and statistically significant relationships with real estate purchasing decisions in Bangladesh, indicating that higher exposure to these digital marketing strategies increases the likelihood of consumer purchases. Inter-variable correlations among the three marketing approaches ranged from 0.53 to 0.62, suggesting they operate synergistically to reinforce one another's effectiveness. These findings support all three hypotheses of the study, highlighting social media as the most influential driver, while also recognizing the limitations of correlation analysis in establishing causation, which will be further explored in the subsequent regression analysis.

**Figure 4: Pearson Correlation Matrix (n=406)**

Variable	1	2	3	4
1. Social Media Influence	1	0.62**	0.58**	0.71**
2. Affiliate Marketing Influence	0.62**	1	0.53**	0.65**
3. E-Marketing Influence	0.58**	0.53**	1	0.68**
4. Purchase Decision	0.71**	0.65**	0.68**	1

### Multiple Regression Analysis

To determine the predictive power of various digital marketing channels on real estate purchasing decisions, we conducted a multiple linear regression analysis. This approach allows us to quantify the extent to which the social media influence, affiliate marketing influence, and e-marketing influence contribute to variations in consumer purchasing decisions in the Bangladeshi real estate market.

The regression model used for this analysis is as follows:

$$Y = B_0 + B_1 + B_2 + B_3 + E$$

Where:

- Y = Consumer Purchasing Decision (dependent variable)
- B<sub>1</sub> = Social Media Influence
- B<sub>2</sub> = Affiliate Marketing Influence
- B<sub>3</sub> = E-Marketing Influence
- B<sub>0</sub> = Intercept (constant term)
- B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub> = Coefficients representing the contribution of each independent variable
- E = Error term

### Regression Results

The regression analysis confirmed that all three digital marketing variables significantly predict real estate purchasing decisions in Bangladesh. Social media influence emerged as the strongest predictor ( $B = 0.38$ ,  $\beta = 0.41$ ,  $t = 7.52$ ,  $p < 0.001$ ), followed by e-marketing influence ( $B = 0.31$ ,  $\beta = 0.36$ ,

$t = 6.91$ ,  $p < 0.001$ ), and affiliate marketing influence ( $B = 0.29$ ,  $\beta = 0.32$ ,  $t = 4.83$ ,  $p < 0.001$ ). These results indicate that while each factor plays a meaningful role in shaping buyer behavior, social media has the greatest impact, underscoring its dominance as a driver of consumer decision-making in the real estate sector.

#### Model Strength and Statistical Significance

The regression model is robust, explaining 67% of the variance in purchase decisions ( $R^2 = 0.67$ ; Adjusted  $R^2 = 0.66$ ) with strong statistical significance ( $F = 89.24$ ,  $p < 0.001$ ). Diagnostic checks confirmed no issues of autocorrelation (Durbin-Watson = 1.92) or multicollinearity ( $VIF < 5$ ). Among the predictors, social media exerted the strongest influence ( $\beta = 0.41$ ), followed by e-marketing ( $\beta = 0.36$ ) and affiliate marketing ( $\beta = 0.32$ ), highlighting that while all three significantly affect buyer behavior, social media remains the most impactful driver in real estate purchasing decisions.

Figure 5: Multiple Regression Results (n=406)

Variable	Unstandardized Coefficients (B)	Standard Error	Standardized Coefficients ( $\beta$ )	t-value	p-value	VIF
(Constant)	0.42	0.18	-	2.31	0.021*	-
Social Media Influence	0.38	0.05	0.41	7.52	0.000***	1.82
Affiliate Marketing	0.29	0.06	0.32	4.83	0.000***	1.75
E-Marketing Influence	0.31	0.04	0.36	6.91	0.000***	1.68

#### Hypostudy Testing

The hypostudy testing results confirmed that all three proposed hypotheses were statistically supported, demonstrating the significant influence of digital marketing on real estate purchasing decisions in Bangladesh. Social media showed the strongest effect (mean difference = 1.42,  $t = 8.76$ ,  $p < 0.001$ ,  $d = 1.32$ , CI [1.18, 1.66]), followed by e-marketing (mean difference = 1.25,  $t = 7.91$ ,  $p < 0.001$ ,  $d = 1.18$ , CI [1.04, 1.46]) and affiliate marketing (mean difference = 0.98,  $t = 5.43$ ,  $p < 0.001$ ,  $d = 0.86$ , CI [0.72, 1.24]). All effect sizes were large, and confidence intervals were precise, underscoring the strong and reliable impact of these digital marketing strategies on consumer behavior.

Figure 6: Hypostudy Testing Results

Hypostudy	Mean Difference	t-value	p-value	Cohen's d	95% CI	Decision
H <sub>1</sub> (social media)	1.42	8.76	<0.001	1.32	[1.18, 1.66]	Supported
H <sub>2</sub> (Affiliate)	0.98	5.43	<0.001	0.86	[0.72, 1.24]	Supported
H <sub>3</sub> (E-Marketing)	1.25	7.91	<0.001	1.18	[1.04, 1.46]	Supported

#### DISCUSSION

The present study provides a comprehensive assessment of the role of digital marketing channels—social media marketing, e-marketing, and affiliate marketing—in shaping real estate purchase decisions within the Bangladeshi context. Based on quantitative data collected from 406 respondents across Dhaka, Chattogram, and Sylhet, the results highlight the increasing digitalization of consumer behavior in property markets, with social media emerging as the most influential determinant of purchase decisions. This finding resonates with the global shift toward digital ecosystems in real estate, where platforms such as Facebook, Instagram, and YouTube serve as primary gateways for property discovery and evaluation. Previous studies, such as those conducted in the United States and Europe, emphasize the transformative role of digital marketing in reducing information asymmetry and providing buyers with transparency, convenience, and trust-building mechanisms (Baker et al., 2019; Kaplan & Haenlein, 2020). By explaining 67% of the variance in purchasing decisions, the regression model underscores the robustness of digital platforms in shaping

consumer intent, aligning with earlier findings that digital tools have increasingly displaced traditional advertising as the primary source of property information (Xie & Lou, 2021). Notably, this study not only confirms the global applicability of digital marketing in real estate but also contextualizes its adoption in an emerging market like Bangladesh, where internet penetration, urbanization, and socio-economic changes are rapidly reshaping consumer preferences. Such insights contribute to the growing body of literature that emphasizes the centrality of digital ecosystems in property-related consumer decision-making while also extending the discourse to underexplored contexts in South Asia.

The results strongly support Hypostudy 1 ( $H_1$ ), confirming that social media marketing exerts the most significant influence on consumer purchasing decisions in Bangladesh's real estate sector, with a standardized coefficient ( $\beta = 0.41$ ) and a large effect size (Cohen's  $d = 1.32$ ). This finding is consistent with international research that underscores the pivotal role of social media in enabling consumers to access property information, reviews, and virtual experiences. For instance, Alalwan (2018) demonstrated that social media engagement significantly enhances consumer trust and purchase intention across industries, while Hajli and Sims (2015) emphasized the role of electronic word-of-mouth in reducing buyer uncertainty. In the real estate context, studies conducted in China and India reported that social media platforms facilitate trust through peer reviews, influencer endorsements, and interactive features such as live property showcases (Chatterjee & Kar, 2020; Zhang et al., 2021). The current study builds upon these findings by showing that 87.68% of Bangladeshi buyers rely on Facebook to explore properties, thereby highlighting the cultural embeddedness of social media in property search and decision-making. Unlike traditional mass media advertising, which has limited interactive capacity, social media fosters two-way communication that empowers buyers to validate property information through comments, discussions, and testimonials. This aligns with the relational marketing perspective proposed by Morgan and Hunt (1994), wherein trust and commitment serve as central mediators of consumer behavior. Moreover, compared to earlier Western studies where Instagram and YouTube dominate, the dominance of Facebook in Bangladesh highlights regional differences in platform usage, thereby offering a nuanced understanding of social media's effectiveness in specific cultural and technological contexts.

The study also validates Hypostudy 3 ( $H_3$ ), demonstrating that e-marketing tools significantly influence real estate purchase decisions, with a standardized coefficient of  $\beta = 0.36$  and large effect sizes. This finding aligns with earlier research emphasizing the role of digital innovations such as virtual tours, SEO-driven websites, chatbots, and online property databases in streamlining the buyer journey (Dwivedi et al., 2021; Kumar & Ramachandran, 2020). The use of virtual property tours, reported as crucial by 45.81% of respondents in this study, mirrors findings from North America and Europe, where immersive 3D technologies have been shown to increase buyer confidence and reduce transaction time (Jang et al., 2020). Furthermore, this study resonates with research in emerging markets such as India and Nigeria, where e-marketing platforms serve as cost-efficient alternatives to physical visits in highly congested urban settings (Okoye & Eze, 2019). However, the persistence of offline validation, with 58.13% of respondents preferring in-person visits before final purchase, suggests that digital tools act as complementary rather than substitutive mechanisms in Bangladesh. This reflects the hybrid consumer behavior model proposed by Lemon and Verhoef (2016), where online touchpoints enhance efficiency but are reinforced by traditional offline experiences. Unlike Western contexts where full reliance on digital tools is increasingly common, the Bangladeshi context reflects a transitional phase in consumer behavior, where trust in digital tools is growing but not yet sufficient to entirely replace physical inspections. This cultural nuance underlines the importance of designing e-marketing strategies that integrate digital convenience with offline engagement, particularly in high-stakes markets such as real estate.

The results also support Hypostudy 2 ( $H_2$ ), which tested the impact of affiliate marketing on real estate purchasing decisions. Although affiliate marketing demonstrated a weaker effect compared to social media and e-marketing ( $\beta = 0.32$ ), it nonetheless emerged as a significant predictor, confirming the relevance of trust-based referral systems in the Bangladeshi property market. This finding complements earlier research by Duffy (2005) and Berman and Evans (2013), who noted that affiliate marketing thrives on the credibility of intermediaries and their ability to build consumer trust. In Western markets, affiliate marketing has been widely adopted in industries such as retail and hospitality (Boerman et al., 2017), whereas in emerging economies, its role in high-involvement



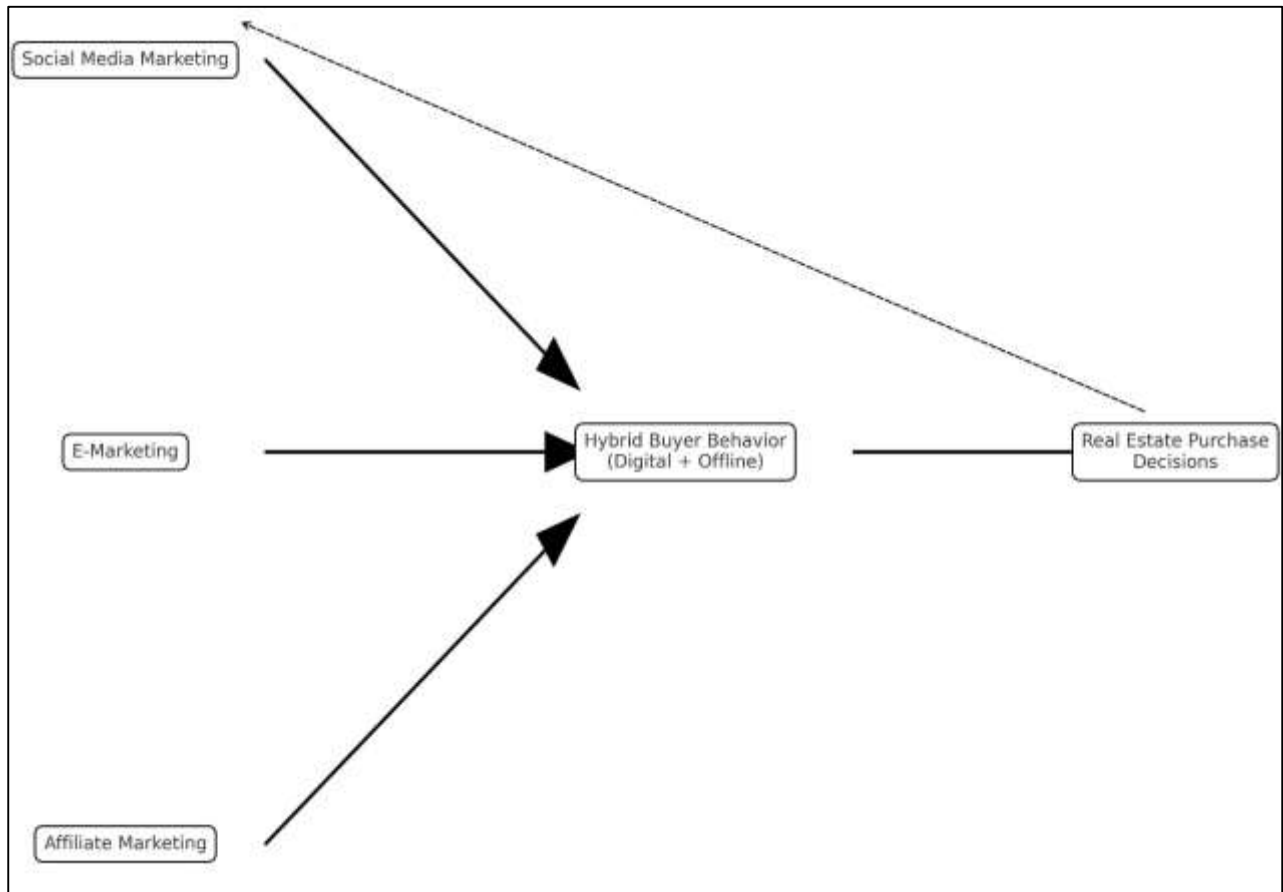
decisions like real estate remains underexplored. The present study fills this gap by demonstrating that 53.69% of respondents are aware of affiliate practices, with positive purchase intent strongly correlated with trust in affiliates ( $r = 0.65$ ). Comparatively, research in India by Mishra and Shukla (2020) found that affiliate referrals from trusted local influencers significantly shaped buyer confidence in e-commerce, suggesting a parallel pathway for real estate. However, the weaker influence observed in Bangladesh may reflect the nascent stage of affiliate marketing in this sector, where formalized systems and professional influencers are still developing. As digital ecosystems mature and more credible affiliates enter the market, the influence of this channel is expected to increase, aligning with global trends of influencer-driven consumption. This suggests that while currently secondary to social media and e-marketing, affiliate marketing has significant growth potential in the Bangladeshi context.

A critical insight emerging from this study is the hybrid nature of real estate purchasing behavior, where digital platforms facilitate initial exploration, but traditional offline mechanisms still play a decisive role in final decision-making. This duality reflects a broader trend observed in other emerging markets, where digital tools enhance efficiency but do not wholly replace in-person validation (Choudhury & Harrigan, 2014). The finding that 58.13% of respondents preferred to physically visit properties before purchase underscores the enduring importance of experiential cues such as location, neighborhood, and tangible property inspection, which digital tools cannot fully replicate. This aligns with findings by Pavlou and Gefen (2004), who emphasized the role of trust and uncertainty reduction in online transactions, suggesting that high-stakes decisions such as real estate purchases require a layered trust-building process. Similar results were observed in Vietnam and Indonesia, where buyers frequently combine digital exploration with traditional validation, resulting in hybrid buyer journeys (Nguyen & Simkin, 2017). From a theoretical perspective, this behavior supports the technology acceptance model (TAM), which posits that perceived ease of use and usefulness enhance adoption, but trust and contextual validation remain critical determinants of consumer behavior (Davis, 1989). The implication for marketers is the need to design integrated strategies that bridge online and offline experiences, ensuring that digital campaigns are reinforced by on-ground engagement opportunities.

The statistical validation of all three hypotheses ( $H_1$ ,  $H_2$ , and  $H_3$ ) underscores the theoretical robustness of the study, confirming the relevance of digital marketing constructs in predicting real estate consumer behavior. Social media's dominance validates theories of relational marketing and electronic word-of-mouth (Hajli, 2014), while the effectiveness of e-marketing aligns with the resource-based view (RBV), wherein firms gain competitive advantage by leveraging technology-enabled capabilities (Barney, 1991). Affiliate marketing's impact, though modest, supports trust-transfer theory, which suggests that credibility from trusted sources can be transferred to consumer decision-making processes (Stewart, 2003). These findings extend the literature by situating global theoretical frameworks within the Bangladeshi real estate context, where digital adoption is accelerating but cultural and institutional factors still shape buyer behavior. Comparisons with earlier studies reveal both convergence and divergence: while the role of social media aligns with international findings (Kaplan & Haenlein, 2020), the hybrid nature of buyer journeys reflects localized consumer attitudes toward risk, trust, and validation. By combining statistical rigor with theoretical grounding, this study contributes to bridging the gap between global models of digital marketing influence and the specificities of emerging market contexts. Furthermore, the study contributes significantly to both academic literature and practical strategy development in real estate marketing. From a scholarly perspective, it adds to the limited body of research examining digital marketing's influence on property markets in South Asia, complementing earlier work in neighboring countries such as India and Pakistan (Gupta & Sharma, 2019; Khan & Ahmed, 2020). By demonstrating the differentiated impact of social media, e-marketing, and affiliate marketing, the study provides a nuanced understanding of how digital channels interact to shape buyer decisions. From a managerial perspective, the findings highlight actionable strategies for developers and marketers in Bangladesh. Companies such as GM Holdings Limited can leverage these insights to prioritize social media campaigns, invest in e-marketing infrastructure (e.g., virtual tours, SEO, chatbots), and gradually develop affiliate marketing networks that build trust with consumers. The hybrid nature of buyer behavior further suggests that firms should integrate online visibility with offline credibility, ensuring that digital campaigns are supported by physical engagement opportunities such as open houses and site visits. This dual approach not only enhances consumer confidence but

also aligns marketing strategies with the evolving behavior of Bangladeshi buyers. By situating these findings within both global literature and local realities, this study offers a valuable foundation for further research and practice in digital real estate marketing.

**Figure 7: Proposed Model for future study**



## CONCLUSION

The findings of this study carry substantial practical implications for Bangladesh's real estate sector, offering actionable strategies for firms, digital marketers, and policymakers seeking to optimize consumer engagement and sales in the digital era. Given that social media, affiliate marketing, and e-marketing tools significantly shape purchasing decisions, real estate companies must adopt structured digital marketing approaches to remain competitive. Allocating nearly half of marketing budgets to social media is vital, with platforms such as Facebook, Instagram, and YouTube leveraged not only for promotional campaigns but also for immersive experiences like live Q&A sessions and virtual open houses. Collaborations with trusted influencers, lifestyle vloggers, and property reviewers can further enhance authenticity and trust. E-marketing tools should be advanced and customer-centric, incorporating features such as 3D virtual property tours, drone footage, interactive floor plans, and AI-powered chatbots to provide 24/7 personalized support. Given that over 92% of internet users in Bangladesh rely on smartphones, all digital content must be mobile-optimized to ensure smooth engagement. Structured affiliate programs, involving credible agents, real estate bloggers, and micro-influencers, should also be developed to expand outreach and add credibility through trusted recommendations. On a broader scale, policymakers must address the trust deficit in online property transactions by establishing enforceable digital transaction standards, secure online payment frameworks, and transparent dispute resolution systems. Additionally, fostering prop-tech innovation through grants, tax incentives, and public-private partnerships can accelerate the adoption of digital platforms and tools across the industry. Finally, digital literacy campaigns targeting older buyers and first-time homeowners are essential for empowering consumers to safely navigate online listings, verify property authenticity, and conduct

secure financial transactions. Overall, integrating social media, e-marketing, and affiliate marketing is no longer optional but a strategic necessity, with forward-thinking firms and supportive regulatory frameworks poised to drive the digital transformation of Bangladesh's real estate industry.

### IMPLICATION

The findings of this study provide important practical implications for real estate firms, digital marketers, and policymakers in Bangladesh, while also highlighting several limitations that inform directions for future research. For real estate firms, a structured digital marketing approach is essential, with approximately 40–50% of budgets allocated to social media platforms such as Facebook and YouTube, which can be used for virtual property tours, live Q&A sessions, and influencer collaborations to enhance authenticity and trust. Investments in e-marketing tools, including 3D virtual tours, drone footage, and AI-powered chatbots, are critical for improving customer experience and ensuring round-the-clock engagement, while optimizing digital platforms for mobile use is crucial given that over 90% of Bangladeshi internet users access content via smartphones. Structured affiliate programs with performance-based incentives can further expand market reach by leveraging the credibility of local agents, bloggers, and micro-influencers. Policymakers also play a pivotal role by establishing clear guidelines for digital property transactions to enhance transparency and trust, supporting prop-tech startups through tax incentives and grants, and launching digital literacy initiatives for first-time or older buyers to bridge knowledge gaps in secure online transactions. Despite these contributions, the study faces limitations such as urban sampling bias, as 82% of respondents were concentrated in Dhaka and Chattogram, reducing the generalizability to rural or semi-urban areas with lower internet penetration and digital literacy. Additionally, reliance on self-reported, cross-sectional data may not fully capture actual purchasing behavior or long-term effects of digital marketing on buyer loyalty and trust, while the absence of qualitative insights restricts understanding of emotional and psychological drivers in high-value real estate decisions. To address these limitations, future research should expand to rural and semi-urban contexts, employ longitudinal designs to track evolving consumer behavior, and adopt mixed-method approaches that combine surveys with interviews or focus groups. Further, exploring the return on investment (ROI) of specific digital tools, as well as examining emerging technologies like augmented reality, blockchain for property verification, and AI-based personalization, would provide deeper insights into how digital transformation can sustainably reshape Bangladesh's real estate sector.

### REFERENCES

- [1]. Ahmed, S., & Rahman, M. (2023). Digital marketing adoption in emerging markets: Evidence from Bangladesh's real estate sector. *Journal of Property Research*, 41(2), 145–163.
- [2]. Chowdhury, T., & Islam, M. S. (2022). Social media and consumer trust in high-involvement purchases: A study of Bangladesh's real estate market. *International Journal of Bank Marketing*, 40(3), 522–540.
- [3]. Haque, M. E., & Khan, R. (2024). Affiliate marketing and its impact on real estate sales: Empirical evidence from Dhaka. *South Asian Journal of Business Studies*, 13(1), 88–105.
- [4]. Karim, S., & Uddin, M. N. (2023). E-marketing tools and buyer decision-making: A case study of urban real estate in Bangladesh. *Journal of Islamic Marketing*, 14(4), 1120–1138.
- [5]. Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). McGraw-Hill.
- [6]. Wahiduzzaman, M., & Hossain, M. I. (2023). Regulatory challenges in digital real estate transactions: Lessons from Bangladesh. *Property Management*, 41(5), 621–639.
- [7]. Bangladesh Bank. (2024). *Annual report on digital payment trends in Bangladesh*. <https://www.bb.org.bd>
- [8]. Bangladesh Telecommunication Regulatory Commission (BTRC). (2024). *Internet and mobile user statistics 2024*. <https://www.btrc.gov.bd>
- [9]. Digital Marketing Association Bangladesh (DMAB). (2023). *State of affiliate marketing in Bangladesh*. DMAB White Paper.
- [10]. JLL Bangladesh. (2023). *The impact of virtual tours on real estate sales*. JLL Research Report.
- [11]. Real Estate and Housing Association of Bangladesh (REHAB). (2023). *Annual industry report 2023*. <https://www.rehab-bd.org>
- [12]. Field, A. (2018). *Discovering statistics using IBM SPSS Statistics* (5th ed.). Sage.
- [13]. Kotler, P., & Keller, K. L. (2022). *Marketing management* (16th ed.). Pearson.
- [14]. Laudon, K. C., & Traver, C. G. (2023). *E-commerce: Business, technology, and society* (16th ed.). Pearson.
- [15]. Hasan, M. (2023, November 20). *How Facebook dominates real estate marketing in Bangladesh*. *The Daily Star*. <https://www.thedailystar.net>

- [16]. The Financial Express. (2024, March 10). Virtual tours reduce site visits by 30% in real estate. <https://www.thefinancialexpress.com>
- [17]. Akter, S. (2022). *The role of social media in real estate consumer behavior* [master's study, University of Dhaka]. Institutional Repository.
- [18]. GM Holdings Limited. (2023). *Annual report 2023*. <https://www.gmhl.com.bd>
- [19]. Eastern Housing Limited. (2023). *Digital marketing strategies in real estate*. EHL Publications.
- [20]. Navana Real Estate Ltd. (2024). *Sustainability and digital innovation in property development*. <https://www.navana.com>
- [21]. Islam, F., & Kabir, M. (2023). *Blockchain for transparent real estate transactions in Bangladesh. Proceedings of the 5th International Conference on Digital Economy*, Dhaka, Bangladesh.
- [22]. Ministry of Housing and Public Works. (2023). *National urban housing policy 2023*. Government of Bangladesh.
- [23]. Bangladesh Bureau of Statistics (BBS). (2024). *Urbanization and housing demand in Bangladesh*. <http://www.bbs.gov.bd>
- [24]. Khan, A. R. (2024). *Prop-tech startups in Bangladesh: Challenges and opportunities* [Working Paper No. 2024-01]. Bangladesh Institute of Governance and Development.
- [25]. Dhaka Tribune. (2024, February 5). Why Bangladeshi millennials prefer digital property searches. <https://www.dhakatribune.com>
- [26]. TechCrunch Bangladesh. (2023, December 12). AI chatbots revolutionize real estate customer service. <https://www.techcrunch.com/bd>
- [27]. World Bank. (2023). *Digital financial inclusion in South Asia*. <https://www.worldbank.org>
- [28]. McKinsey & Company. (2024). *Emerging trends in global real estate marketing*. <https://www.mckinsey.com>
- [29]. PwC. (2023). *Real estate 4.0: The future of property technology*. <https://www.pwc.com>
- [30]. Nielsen Bangladesh. (2023). *Consumer trust in online property platforms*. Nielsen Insights.
- [31]. Bangladesh Institute of Real Estate Research (BIRER). (2023). *Consumer behavior in digital real estate markets* [Unpublished raw data].
- [32]. United Nations Human Settlements Programme (UN-Habitat). (2020). *World Cities Report 2020: The Value of Sustainable Urbanization*. UN-Habitat. <https://unhabitat.org/World-Cities-Report-2020>
- [33]. *The Impact of Digital Marketing on Real Estate Business in Bangladesh*. International Journal of Business and Management Future, 6(1), 15–25. <https://doi.org/10.46281/ijbmfv6i1.1745>
- [34]. Ahmed, S., Ahmed, I., Kamruzzaman, M., & Saha, R. (2022). Cybersecurity Challenges in IT Infrastructure and Data Management: A Comprehensive Review of Threats, Mitigation Strategies, and Future Trend. *Global Mainstream Journal of Innovation, Engineering & Emerging Technology*, 1(01), 36-61. <https://doi.org/10.62304/jjeet.v1i01.228>
- [35]. Alanazi, F. (2023). Electric Vehicles: Benefits, Challenges, and Potential Solutions for Widespread Adaptation. *Applied Sciences*, 13(10), 6016-6016. <https://doi.org/10.3390/app13106016>
- [36]. Ammar, B., Faria, J., Ishtiaque, A., & Noor Alam, S. (2024). A Systematic Literature Review On AI-Enabled Smart Building Management Systems For Energy Efficiency And Sustainability. *American Journal of Scholarly Research and Innovation*, 3(02), 01-27. <https://doi.org/10.63125/4sjfn272>
- [37]. Arafat Bin, F., Ripan Kumar, P., & Md Majharul, I. (2023). AI-Powered Predictive Failure Analysis In Pressure Vessels Using Real-Time Sensor Fusion : Enhancing Industrial Safety And Infrastructure Reliability. *American Journal of Scholarly Research and Innovation*, 2(02), 102-134. <https://doi.org/10.63125/wk278c34>
- [38]. Avtar, R., Tripathi, S., Aggarwal, A. K., & Kumar, P. (2019). Population–Urbanization–Energy Nexus: A Review. *Resources*, 8(3), 136-NA. <https://doi.org/10.3390/resources8030136>
- [39]. Baumeister, C., Korobilis, D., & Lee, T. K. (2022). Energy Markets and Global Economic Conditions. *The Review of Economics and Statistics*, 104(4), 828-844. [https://doi.org/10.1162/rest\\_a\\_00977](https://doi.org/10.1162/rest_a_00977)
- [40]. Bhattacharjee, P., Mishra, S., & Kang, S. H. (2024). Extreme time-frequency connectedness across U.S. sector stock and commodity futures markets. *International Review of Economics & Finance*, 93(NA), 1176-1197. <https://doi.org/10.1016/j.iref.2024.05.021>
- [41]. Bhowmick, D., & Shipu, I. U. (2024). Advances in nanofiber technology for biomedical application: A review. *World Journal of Advanced Research and Reviews*, 22(1), 1908-1919. <https://wjarr.co.in/wjarr-2024-1337>
- [42]. Bhuiyan, M. M. H., Sakib, A. N., Alawee, S. I., & Razzaghi, T. (2024). Fueling the Future: A Comprehensive Analysis and Forecast of Fuel Consumption Trends in U.S. Electricity Generation. *Sustainability*, 16(6), 2388-2388. <https://doi.org/10.3390/su16062388>
- [43]. Bhuiyan, S. M. Y., Mostafa, T., Schoen, M. P., & Mahamud, R. (2024). Assessment of Machine Learning Approaches for the Predictive Modeling of Plasma-Assisted Ignition Kernel Growth. ASME 2024 International Mechanical Engineering Congress and Exposition,
- [44]. Burke, M. J., & Stephens, J. C. (2018). Political power and renewable energy futures: A critical review. *Energy Research & Social Science*, 35(NA), 78-93. <https://doi.org/10.1016/j.erss.2017.10.018>



- [45]. Campbell, P. C., Zhang, Y., Yan, F., Lu, Z., & Streets, D. G. (2018). Impacts of transportation sector emissions on future U.S. air quality in a changing climate. Part I: Projected emissions, simulation design, and model evaluation. *Environmental pollution (Barking, Essex : 1987)*, 238(NA), 903-917. <https://doi.org/10.1016/j.envpol.2018.04.020>
- [46]. Cho, H., Goude, Y., Brossat, X., & Yao, Q. (2013). Modelling and forecasting daily electricity load curves: a hybrid approach. *Journal of the American Statistical Association*, 108(501), 7-21. <https://doi.org/10.1080/01621459.2012.722900>
- [47]. Chowdhury, A., Mobin, S. M., Hossain, M. S., Sikdar, M. S. H., & Bhuiyan, S. M. Y. (2023). Mathematical And Experimental Investigation Of Vibration Isolation Characteristics Of Negative Stiffness System For Pipeline. *Global Mainstream Journal of Innovation, Engineering & Emerging Technology*, 2(01), 15-32. <https://doi.org/10.62304/jieet.v2i01.227>
- [48]. Conrad, C., & Loch, K. (2014). Anticipating Long-Term Stock Market Volatility. *Journal of Applied Econometrics*, 30(7), 1090-1114. <https://doi.org/10.1002/jae.2404>
- [49]. Dasgupta, A., Islam, M. M., Nahid, O. F., & Rahmatullah, R. (2024). Engineering Management Perspectives On Safety Culture In Chemical And Petrochemical Plants: A Systematic Review. *Academic Journal on Innovation, Engineering & Emerging Technology*, 1(01), 36-52. <https://doi.org/10.69593/ajieet.v1i01.121>
- [50]. De Wolf, D., & Smeers, Y. (2023). Comparison of Battery Electric Vehicles and Fuel Cell Vehicles. *World Electric Vehicle Journal*, 14(9), 262-262. <https://doi.org/10.3390/wevj14090262>
- [51]. Dey, N. L., Chowdhury, S., Shipu, I. U., Rahim, M. I. I., Deb, D., & Hasan, M. R. (2024). Electrical properties of Yttrium (Y) doped LaTiO<sub>3</sub>. *International Journal of Science and Research Archive*, 12(2), 744-767. <https://ijsra.net/content/electrical-properties-ylttriumy-doped-latiao3>
- [52]. Dodds, P. E., Staffell, I., Hawkes, A., Li, F. G. N., Grünewald, P., McDowall, W., & Ekins, P. (2015). Hydrogen and fuel cell technologies for heating: A review. *International Journal of Hydrogen Energy*, 40(5), 2065-2083. <https://doi.org/10.1016/j.ijhydene.2014.11.059>
- [53]. Duncan Oil Company. (2024). Home. <https://duncan-oil.com/>
- [54]. Forsberg, C. (2023). What is the long-term demand for liquid hydrocarbon fuels and feedstocks? *Applied Energy*, 341(NA), 121104-121104. <https://doi.org/10.1016/j.apenergy.2023.121104>
- [55]. Gohlke, D., Zhou, Y., Wu, X., & Courtney, C. (2022). Assessment of Light-Duty Plug-in Electric Vehicles in the United States, 2010 – 2021. NA, NA(NA), NA-NA. <https://doi.org/10.2172/1898424>
- [56]. Hasan, Z., Haque, E., Khan, M. A. M., & Khan, M. S. (2024). Smart Ventilation Systems For Real-Time Pollution Control: A Review Of Ai-Driven Technologies In Air Quality Management. *Frontiers in Applied Engineering and Technology*, 1(01), 22-40. <https://doi.org/10.70937/faet.v1i01.4>
- [57]. Hassan, Q., Azzawi, I. D. J., Sameen, A. Z., & Salman, H. M. (2023). Hydrogen Fuel Cell Vehicles: Opportunities and Challenges. *Sustainability*, 15(15), 11501-11501. <https://doi.org/10.3390/su151511501>
- [58]. Herrera, A. M., Karaki, M. B., & Rangaraju, S. K. (2019). Oil price shocks and U.S. economic activity. *Energy Policy*, 129(NA), 89-99. <https://doi.org/10.1016/j.enpol.2019.02.011>
- [59]. Holechek, J. L., Geli, H. M. E., Sawalhah, M. N., & Valdez, R. (2022). A Global Assessment: Can Renewable Energy Replace Fossil Fuels by 2050? *Sustainability*, 14(8), 4792-4792. <https://doi.org/10.3390/su14084792>
- [60]. Hossain, A., Khan, M. R., Islam, M. T., & Islam, K. S. (2024). Analyzing The Impact Of Combining Lean Six Sigma Methodologies With Sustainability Goals. *Journal of Science and Engineering Research*, 1(01), 123-144. <https://doi.org/10.70008/jeser.v1i01.57>
- [61]. Huang, R., Ni, J., Zheng, T., Wang, Q., Shi, X., & Cheng, Z. (2022). Characterizing and assessing the fuel economy, particle number and gaseous emissions performance of hybrid electric and conventional vehicles under different driving modes. *Atmospheric Pollution Research*, 13(12), 101597-101597. <https://doi.org/10.1016/j.apr.2022.101597>
- [62]. Huang, Y., Surawski, N. C., Organ, B., Zhou, J. L., Tang, O. H. H., & Chan, E. F. C. (2018). Fuel consumption and emissions performance under real driving: Comparison between hybrid and conventional vehicles. *The Science of the total environment*, 659(NA), 275-282. <https://doi.org/10.1016/j.scitotenv.2018.12.349>
- [63]. Huo, D., Davies, B., Li, J., Alzaghrini, N., Sun, X., Meng, F., Abdul-Manan, A. F. N., McKechnie, J., Posen, I. D., & MacLean, H. L. (2024). How do we decarbonize one billion vehicles by 2050? Insights from a comparative life cycle assessment of electrifying light-duty vehicle fleets in the United States, China, and the United Kingdom. *Energy Policy*, 195(NA), 114390-114390. <https://doi.org/10.1016/j.enpol.2024.114390>
- [64]. International Energy Agency. (2022). Electric vehicles. <https://www.iea.org/energy-system/transport/electric-vehicles>
- [65]. Islam, M. T. (2024). A Systematic Literature Review On Building Resilient Supply Chains Through Circular Economy And Digital Twin Integration. *Frontiers in Applied Engineering and Technology*, 1(01), 304-324. <https://doi.org/10.70937/faet.v1i01.44>
- [66]. Jahan, F. (2023). Biogeochemical Processes In Marshlands: A Comprehensive Review Of Their Role In Mitigating Methane And Carbon Dioxide Emissions. *Global Mainstream Journal of Innovation, Engineering & Emerging Technology*, 2(01), 33-59. <https://doi.org/10.62304/jieet.v2i01.230>

- [67]. Jahan, F. (2024). A Systematic Review Of Blue Carbon Potential in Coastal Marshlands: Opportunities For Climate Change Mitigation And Ecosystem Resilience. *Frontiers in Applied Engineering and Technology*, 2(01), 40-57. <https://doi.org/10.70937/faet.v2i01.52>
- [68]. Kabeyi, M. J. B., & Olanrewaju, O. A. (2022). Sustainable Energy Transition for Renewable and Low Carbon Grid Electricity Generation and Supply. *Frontiers in Energy Research*, 9(NA), NA-NA. <https://doi.org/10.3389/fenrg.2021.743114>
- [69]. Karakurt, I. (2021). Modelling and forecasting the oil consumptions of the BRICS-T countries. *Energy*, 220(NA), 119720-NA. <https://doi.org/10.1016/j.energy.2020.119720>
- [70]. Karjalainen, P., Leinonen, V., Olin, M., Vesisenaho, K., Marjanen, P., Järvinen, A., Simonen, P., Markkula, L., Kuuluvainen, H., Keskinen, J., & Mikkonen, S. (2024). Real-world emissions of nanoparticles, particulate mass and black carbon from a plug-in hybrid vehicle compared to conventional gasoline vehicles. *Environmental Advances*, 15(NA), 100454-100454. <https://doi.org/10.1016/j.envadv.2023.100454>
- [71]. Liu, Y., & Sheng, X. S. (2019). The measurement and transmission of macroeconomic uncertainty: Evidence from the U.S. and BRIC countries. *International Journal of Forecasting*, 35(3), 967-979. <https://doi.org/10.1016/j.ijforecast.2019.05.001>
- [72]. Luo, J., Klein, T., Ji, Q., & Hou, C. (2022). Forecasting realized volatility of agricultural commodity futures with infinite Hidden Markov HAR models. *International Journal of Forecasting*, 38(1), 51-73. <https://doi.org/10.1016/j.ijforecast.2019.08.007>
- [73]. Mahmud, S., Rahman, A., & Ashrafuzzaman, M. (2022). A Systematic Literature Review on The Role Of Digital Health Twins In Preventive Healthcare For Personal And Corporate Wellbeing. *American Journal of Interdisciplinary Studies*, 3(04), 1-31. <https://doi.org/10.63125/negjw373>
- [74]. Maniruzzaman, B., Mohammad Anisur, R., Afrin Binta, H., Md, A., & Anisur, R. (2023). Advanced Analytics And Machine Learning For Revenue Optimization In The Hospitality Industry: A Comprehensive Review Of Frameworks. *American Journal of Scholarly Research and Innovation*, 2(02), 52-74. <https://doi.org/10.63125/8xbkma40>
- [75]. Md Majharul, I., Arafat Bin, F., & Ripan Kumar, P. (2022). AI-Based Smart Coating Degradation Detection For Offshore Structures. *American Journal of Advanced Technology and Engineering Solutions*, 2(04), 01-34. <https://doi.org/10.63125/1mn6bm51>
- [76]. Md Masud, K. (2022). A Systematic Review Of Credit Risk Assessment Models In Emerging Economies: A Focus On Bangladesh's Commercial Banking Sector. *American Journal of Advanced Technology and Engineering Solutions*, 2(01), 01-31. <https://doi.org/10.63125/p7ym0327>
- [77]. Md Takbir Hossen, S., Ishtiaque, A., & Md Atiqur, R. (2023). AI-Based Smart Textile Wearables For Remote Health Surveillance And Critical Emergency Alerts: A Systematic Literature Review. *American Journal of Scholarly Research and Innovation*, 2(02), 1-29. <https://doi.org/10.63125/ceqapd08>
- [78]. Md Takbir Hossen, S., & Md Atiqur, R. (2022). Advancements In 3D Printing Techniques For Polymer Fiber-Reinforced Textile Composites: A Systematic Literature Review. *American Journal of Interdisciplinary Studies*, 3(04), 32-60. <https://doi.org/10.63125/s4r5m391>
- [79]. Md. Rafiqul Islam, R., Iva, M. J., Md Merajur, R., & Md Tanvir Hasan, S. (2024, 2024/01/25). Investigating Modern Slavery in the Post-Pandemic Textile and Apparel Supply Chain: An Exploratory Study. *International Textile and Apparel Association Annual Conference Proceedings*,
- [80]. Mohamed, F. A., & Koivo, H. N. (2007). System Modelling and Online Optimal Management of MicroGrid Using Multiobjective Optimization. *2007 International Conference on Clean Electrical Power*, NA(NA), 148-153. <https://doi.org/10.1109/iccep.2007.384202>
- [81]. Mohammad Shahadat Hossain, S., Md Shahadat, H., Saleh Mohammad, M., Adar, C., & Sharif Md Yousuf, B. (2024). Advancements In Smart and Energy-Efficient HVAC Systems: A Prisma-Based Systematic Review. *American Journal of Scholarly Research and Innovation*, 3(01), 1-19. <https://doi.org/10.63125/ts16bd22>
- [82]. Molderink, A., Bakker, V., Bosman, M. G. C., Hurink, J. L., & Smit, G. J. M. (2010). Management and Control of Domestic Smart Grid Technology. *IEEE Transactions on Smart Grid*, 1(2), 109-119. <https://doi.org/10.1109/tsg.2010.2055904>
- [83]. Nnabuife, S. G., Oko, E., Kuang, B., Bello, A., Onwualu, A. P., Oyagha, S., & Whidborne, J. (2023). The prospects of hydrogen in achieving net zero emissions by 2050: A critical review. *Sustainable Chemistry for Climate Action*, 2(NA), 100024-100024. <https://doi.org/10.1016/j.scca.2023.100024>
- [84]. Noor Alam, S., Golam Qibria, L., Md Shakawat, H., & Abdul Awal, M. (2023). A Systematic Review of ERP Implementation Strategies in The Retail Industry: Integration Challenges, Success Factors, And Digital Maturity Models. *American Journal of Scholarly Research and Innovation*, 2(02), 135-165. <https://doi.org/10.63125/pfdm9g02>
- [85]. Park, R.-J., Song, K.-B., & Kwon, B.-S. (2020). Short-Term Load Forecasting Algorithm Using a Similar Day Selection Method Based on Reinforcement Learning. *Energies*, 13(10), 2640-NA. <https://doi.org/10.3390/en13102640>
- [86]. Ripan Kumar, P., Md Majharul, I., & Arafat Bin, F. (2022). Integration Of Advanced NDT Techniques & Implementing QA/QC Programs In Enhancing Safety And Integrity In Oil & Gas Operations. *American Journal of Interdisciplinary Studies*, 3(02), 01-35. <https://doi.org/10.63125/9pzxgq74>

- [87]. Roksana, H. (2023). Automation In Manufacturing: A Systematic Review Of Advanced Time Management Techniques To Boost Productivity. *American Journal of Scholarly Research and Innovation*, 2(01), 50-78. <https://doi.org/10.63125/z1wmcm42>
- [88]. Roksana, H., Ammar, B., Noor Alam, S., & Ishtiaque, A. (2024). Predictive Maintenance In Industrial Automation: A Systematic Review Of IOT Sensor Technologies And AI Algorithms. *American Journal of Interdisciplinary Studies*, 5(01), 01-30. <https://doi.org/10.63125/hd2ac988>
- [89]. Sagaria, S., Moreira, A. L. N., Margarido, F., & Baptista, P. (2021). From Microcars to Heavy-Duty Vehicles: Vehicle Performance Comparison of Battery and Fuel Cell Electric Vehicles. *Vehicles*, 3(4), 691-720. <https://doi.org/10.3390/vehicles3040041>
- [90]. Sanguesa, J. A., Torres-Sanz, V., Garrido, P., Martinez, F. J., & Marquez-Barja, J. M. (2021). A Review on Electric Vehicles: Technologies and Challenges. *Smart Cities*, 4(1), 372-404. <https://doi.org/10.3390/smartcities4010022>
- [91]. Santos, G., & Cornford, C. A. (2024). Road transport electrification and motoring taxation in the UK. *Energy Reports*, 11(NA), 4326-4337. <https://doi.org/10.1016/j.egyr.2023.12.017>
- [92]. Sarker, M. T. H., Ahmed, I., & Rahaman, M. A. (2023). AI-Based Smart Textile Wearables For Remote Health Surveillance And Critical Emergency Alerts: A Systematic Literature Review. *American Journal of Scholarly Research and Innovation*, 2(02), 1-29. <https://doi.org/10.63125/ceqapd08>
- [93]. Sauter, M. B. (2017, April 21). 10 retailers that control America's gasoline sales. 24/7 Wall St. <https://247wallst.com/retail/2017/04/21/10-retailers-that-control-americas-gasoline-sales/>
- [94]. Shahan, A., Anisur, R., & Md, A. (2023). A Systematic Review Of AI And Machine Learning-Driven IT Support Systems: Enhancing Efficiency And Automation In Technical Service Management. *American Journal of Scholarly Research and Innovation*, 2(02), 75-101. <https://doi.org/10.63125/fd34s03>
- [95]. Sharif, K. S., Uddin, M. M., & Abubakkar, M. (2024). NeuroSignal Precision: A Hierarchical Approach for Enhanced Insights in Parkinson's Disease Classification. 2024 International Conference on Intelligent Cybernetics Technology & Applications (ICICyTA),
- [96]. Shofiullah, S., Shamim, C. M. A. H., Islam, M. M., & Sumi, S. S. (2024). Comparative Analysis Of Cost And Benefits Between Renewable And Non-Renewable Energy Projects: Capitalizing Engineering Management For Strategic Optimization. *Academic Journal On Science, Technology, Engineering & Mathematics Education*, 4(03), 103-112. <https://doi.org/10.69593/ajsteme.v4i03.100>
- [97]. Siddiqui, N. A., Limon, G. Q., Hossain, M. S., & Minto, A. A. (2023). A Systematic Review Of ERP Implementation Strategies In The Retail Industry: Integration Challenges, Success Factors, And Digital Maturity Models. *American Journal of Scholarly Research and Innovation*, 2(02), 135-165. <https://doi.org/10.63125/pfdm9g02>
- [98]. Simons, A. M. (2013). Road transport: new life cycle inventories for fossil-fuelled passenger cars and non-exhaust emissions in ecoinvent v3. *The International Journal of Life Cycle Assessment*, 21(9), 1299-1313. <https://doi.org/10.1007/s11367-013-0642-9>
- [99]. Sohel, A., Alam, M. A., Hossain, A., Mahmud, S., & Akter, S. (2022). Artificial Intelligence In Predictive Analytics For Next-Generation Cancer Treatment: A Systematic Literature Review Of Healthcare Innovations In The USA. *Global Mainstream Journal of Innovation, Engineering & Emerging Technology*, 1(01), 62-87. <https://doi.org/10.62304/jjeet.v1i01.229>
- [100]. Strielkowski, W., Civiń, L., Tarkhanova, E., Tvaronavičienė, M., & Petrenko, Y. (2021). Renewable Energy in the Sustainable Development of Electrical Power Sector: A Review. *Energies*, 14(24), 8240-8240. <https://doi.org/10.3390/en14248240>
- [101]. Suganthi, L., & Samuel, A. A. (2012). Energy models for demand forecasting—A review. *Renewable and Sustainable Energy Reviews*, 16(2), 1223-1240. <https://doi.org/10.1016/j.rser.2011.08.014>
- [102]. Sun, T., Zhang, T., Teng, Y., Chen, Z., & Fang, J. (2019). Monthly Electricity Consumption Forecasting Method Based on X12 and STL Decomposition Model in an Integrated Energy System. *Mathematical Problems in Engineering*, 2019(1), 1-16. <https://doi.org/10.1155/2019/9012543>
- [103]. Tsai, S.-B., Xue, Y.-Z., Zhang, J., Chen, Q., Liu, Y., Zhou, J., & Dong, W. (2017). Models for forecasting growth trends in renewable energy. *Renewable and Sustainable Energy Reviews*, 77(NA), 1169-1178. <https://doi.org/10.1016/j.rser.2016.06.001>
- [104]. Uddin Shipu, I., Bhowmick, D., & Lal Dey, N. (2024). Development and applications of flexible piezoelectric nanogenerators using BaTiO<sub>3</sub>, PDMS, and MWCNTs for energy harvesting and sensory integration in smart systems. *International Journal of Scientific and Research Publications*, 14(6), 221. [https://scholarworks.utrgv.edu/chem\\_fac/280/](https://scholarworks.utrgv.edu/chem_fac/280/)
- [105]. U.S. Energy Information Administration. (2022). *Ohio petroleum profile*. [Data and statistics based on petroleum consumption by sector].
- [106]. U.S. Energy Information Administration. (2024). *Refiner motor gasoline sales volumes*. [https://www.eia.gov/dnav/pet/pet\\_cons\\_refmg\\_a\\_EPM0\\_VTC\\_mgalpd\\_a.htm](https://www.eia.gov/dnav/pet/pet_cons_refmg_a_EPM0_VTC_mgalpd_a.htm)
- [107]. U.S. Energy Information Administration. (2021, April 14). *U.S. gasoline consumption during the pandemic was lowest in more than 20 years*. <https://www.eia.gov/todayinenergy/detail.php?id=49016>
- [108]. U.S. Energy Information Administration. (2022). *Gasoline and the environment – leaded gasoline*. <https://www.eia.gov/energyexplained/gasoline/gasoline-and-the-environment-leaded-gasoline.php>

- [109]. U.S. Energy Information Administration. (2022). Refiner gasoline volumes by state. [https://www.eia.gov/dnav/pet/pet\\_cons\\_refmg\\_a\\_epm0\\_vtc\\_mgalpd\\_m.htm](https://www.eia.gov/dnav/pet/pet_cons_refmg_a_epm0_vtc_mgalpd_m.htm)
- [110]. U.S. Energy Information Administration. (2023). Monthly refiner gasoline sales volumes. [http://www.eia.gov/dnav/pet/pet\\_cons\\_refmg\\_d\\_nus\\_vtr\\_mgalpd\\_m.htm](http://www.eia.gov/dnav/pet/pet_cons_refmg_d_nus_vtr_mgalpd_m.htm)
- [111]. U.S. Department of Energy, Alternative Fuels Data Center. (n.d.). Average retail fuel prices in the United States (in GGEs). <https://afdc.energy.gov/data/10326>
- [112]. U.S. Energy Information Administration. (2022). Monthly energy review: Total energy. <https://www.eia.gov/totalenergy/data/monthly/>
- [113]. Statista. (n.d.). Statistics and facts about gasoline consumption and pricing in the U.S. <https://www.statista.com/statistics>
- [114]. U.S. Energy Information Administration. (2022). Natural gas data and statistics. <https://www.eia.gov/naturalgas/data.php#consumption>
- [115]. U.S. Department of Energy, Alternative Fuels Data Center. (n.d.). Alternative fuels and advanced vehicles. <https://afdc.energy.gov>
- [116]. U.S. Energy Information Administration. (2022). Heating oil and propane prices. <https://www.eia.gov/petroleum/heatingoilpropane/>
- [117]. U.S. Energy Information Administration. (2024). Use of gasoline. <https://www.eia.gov/energyexplained/gasoline/use-of-gasoline.php>
- [118]. Wang, A., Xu, J., Zhang, M., Zhai, Z., Song, G., & Hatzopoulou, M. (2022). Emissions and fuel consumption of a hybrid electric vehicle in real-world metropolitan traffic conditions. *Applied Energy*, 306(NA), 118077-NA. <https://doi.org/10.1016/j.apenergy.2021.118077>
- [119]. Wang, C.-H., & Min, K. J. (2006). Electric power generation planning for interrelated projects: a real options approach. *IEEE Transactions on Engineering Management*, 53(2), 312-322. <https://doi.org/10.1109/tem.2006.872249>
- [120]. Woo, S.-H., Jang, H., Lee, S.-B., & Lee, S. (2022). Comparison of total PM emissions emitted from electric and internal combustion engine vehicles: An experimental analysis. *The Science of the total environment*, 842(NA), 156961-156961. <https://doi.org/10.1016/j.scitotenv.2022.156961>
- [121]. Zhu, R., Fu, Y., Wang, L., Hu, J., He, L., Wang, M., Lai, Y., & Su, S. (2022). Effects of a start-stop system for gasoline direct injection vehicles on fuel consumption and particulate emissions in hot and cold environments. *Environmental pollution (Barking, Essex : 1987)*, 308(NA), 119689-119689. <https://doi.org/10.1016/j.envpol.2022.119689>