International Journal of Business and Applied Economics (IJBAE)
Vol. 3, No. 5, September 2024: 905-920

Sustainable Innovation: Marketing Strategies to Increase Adoption of Permeable Paving Blocks in Environmentally Conscious Markets

Arief P. Kumaat[1]*, Vekky Supit[2], Melky K. E. Paendong[3], Stefani S. Peginusa[4]
Manado State Polytechnic
Corresponding Author: Arief P. Kumaat arief.kumaat@gmail.com

A R T I C L E I N F O

Keywords: Permeable Paving Blocks, Sustainable Products, Marketing Strategies

Received : 30, July
Revised : 26, August
Accepted: 28, September

A B S T R A C T

This study focuses on developing marketing strategies to increase the adoption of permeable paving blocks, an environmentally friendly product. Using a SWOT analysis, the research identifies strengths such as eco-friendly benefits and weaknesses like limited market awareness. The opportunities involve growing demand for green products, while threats include competition from traditional materials. Data were collected through surveys and interviews with industry experts. Results show that leveraging product sustainability and tapping into government incentives can boost sales, while addressing market education gaps is essential. Strategic use of social media and partnerships with eco-conscious businesses further enhances product visibility. This research provides actionable strategies to improve market positioning and product adoption.

INTRODUCTION

Environmental sustainability has become a global issue, demanding innovative solutions that address both ecological challenges and market competitiveness. In the construction industry, permeable paving blocks are an emerging solution with significant potential to alleviate urban environmental problems. These blocks are designed to allow water infiltration, thus reducing surface water runoff, preventing soil erosion, and decreasing environmental pollution. Moreover, they help reduce the burden on urban drainage systems and promote groundwater recharge, contributing to a balanced hydrological cycle. Despite the clear environmental benefits, the adoption of permeable paving blocks has not yet reached its full potential, largely due to limited consumer awareness and understanding of their advantages.

The success of permeable paving blocks in the market depends on effective marketing strategies, particularly within environmentally conscious markets. SWOT analysis highlights the product's strengths, including its environmental benefits and growing demand for eco-friendly solutions, but also reveals weaknesses such as limited public awareness and initial costs. Opportunities in the market are vast, especially as environmental regulations and green construction projects continue to rise. However, threats such as competition from traditional construction materials and fluctuating market conditions pose challenges.

This study focuses on addressing these market-related challenges by developing sustainable marketing strategies that can increase the adoption of permeable paving blocks. Through targeted marketing research, we aim to identify consumer preferences, enhance brand awareness, and position the product as a competitive, environmentally-friendly solution. By leveraging the strengths and opportunities while mitigating the weaknesses and threats, this research contributes to advancing both the adoption of eco-friendly products and the promotion of sustainable construction practices.

The permeable paving block product used in this study was developed through research and development carried out by the research team at Manado State Polytechnic. Dissemination of the permeable paving block product has been conducted, as recorded in the research publication by Makalew & Supit (2022), which describes the stages of product development. The subsequent steps in the development and utilization of this permeable paving block product are outlined by Supit & Priyono (2023), including technological updates and further product testing. Most recently, a research publication by Tatuhe et al. (2024), reflects the growing interest and recognition of the permeable paving block product in the local academic field.

The partner involved in this research is CV. Tekno Inti Pratama, a company specializing in building construction consultancy, with its office located at Manado. This company will carry out the production process for the permeable paving block product. During the production process, the company will collaborate with local paving block manufacturer located in Matungkas Village, North Minahasa Regency, to develop the permeable paving block product according to specifications based on previous research findings.

LITERATURE REVIEW

Eco-friendly product innovation

Eco-friendly product innovation has become a key focus in efforts to maintain environmental sustainability and minimize negative impacts on ecosystems. In this context, research and development of product innovations that take environmental factors into account are crucial. Eco-friendly product innovation spans various sectors, including the construction industry. One example is the innovation of permeable paving blocks, which aims to reduce water pooling, enhance water infiltration into the soil, and decrease surface runoff that can lead to erosion and water pollution.

Research and academic studies on eco-friendly product innovation, such as permeable paving blocks, involve multiple aspects. A literature review on the latest developments in environmentally friendly construction materials is essential for understanding permeable paving blocks. An article by Chen et al. (2020) presents a comprehensive review of eco-friendly construction materials like recycled concrete, which is often used in the production of permeable paving blocks. Research by Wang et al. (2019) highlights the importance of technological innovation in the development of eco-friendly products. This study offers insights into the latest technologies used in the production of permeable paving blocks, such as 3D printing technology and environmentally friendly additives.

A review by Khan et al. (2018) explores effective marketing and promotional strategies for eco-friendly products. This article provides insights into how marketers can increase awareness and adoption of products like permeable paving blocks through appropriate marketing approaches. Research by Yang et al. (2021) investigates the factors influencing consumer behavior in adopting eco-friendly products. This study is crucial for understanding the challenges in marketing permeable paving blocks to consumers.

Marketing Strategies

Marketing strategies are key elements in introducing and selling products or services to consumers. In the context of marketing eco-friendly and sustainable products, marketing and promotion strategies must be carefully designed to raise consumer awareness and interest in these products, while simultaneously increasing understanding of the importance of maintaining a sustainable environment. This includes understanding the target audience, crafting effective messages, selecting appropriate communication channels, and employing creative promotional methods.

Kotler & Armstrong (2019) provide in-depth insights into the fundamental principles of marketing, including strategies for marketing and promotion, covering relevant concepts such as market segmentation, product differentiation, and marketing communications. Smith & Taylor (2020) discuss the integration of offline and online marketing strategies, including the use of both traditional and digital media. This comprehensive review helps in understanding how to combine various communication channels to effectively reach the target audience.

Ryan & Jones (2019) explore effective digital marketing strategies, including the use of social media, digital content, and data analysis. This review is important for understanding how to leverage digital technology to promote eco-friendly products to consumers. Belch & Belch (2021) discuss an integrated approach to marketing and promotion, emphasizing the importance of unifying various elements of marketing communication. This review offers insights into creating cohesive and effective promotional campaigns.

Increasing Adoption of Eco-Friendly Products

Increasing the adoption of eco-friendly products is a crucial challenge in maintaining environmental sustainability and reducing negative impacts on ecosystems. While awareness of environmental issues is growing among consumers, there are still obstacles to shifting consumption behavior towards more eco-friendly products. Therefore, research and academic studies on strategies to increase the adoption of environmentally friendly products are vital. This review will encompass various aspects, including factors that influence consumer decisions, effective marketing strategies, and the role of government regulations in promoting eco-friendly product adoption.

Such analysis can provide valuable insights into how to increase the adoption of eco-friendly products in competitive markets. Schwartz (2019) discusses psychological factors that influence individual behavior in the context of environmental sustainability. This review can help understand the motivations and barriers affecting consumer decisions regarding the adoption of eco-friendly products. Thogersen (2019) explores various marketing strategies that can be used to promote eco-friendly products to consumers, offering insights into designing effective marketing campaigns to boost sustainable product adoption.

Steg & Vlek (2019) present a comprehensive review of strategies to encourage pro-environmental behavior, including the adoption of eco-friendly products. This review provides insights into factors that influence consumer decisions and effective strategies for changing their behavior. Hertwich & Peters (2019) analyze the carbon footprint of consumer products and their environmental impact, highlighting the importance of eco-friendly products in reducing global environmental harm.

Competitive Analysis and Market Position

Competitive analysis and market positioning are critical processes for understanding the business environment in which a product or company operates. This analysis involves assessing competitors within the industry, evaluating the relative strengths and weaknesses of a product or company, and identifying opportunities and threats faced. A clear understanding of market positioning helps companies design effective marketing strategies, product development, and decision-making.

This review encompasses various aspects, including competitive analysis methodologies, market evaluation, and product development strategies. Moller et al. (2021) discuss the role of companies as intermediaries in driving market innovation. This review offers insights into how companies can

use competitive analysis to identify innovation opportunities and create a unique market position. Kohli & Jaworski (2017) explore the concept of market orientation and its implications in competitive analysis and market positioning. This review provides a deep understanding of how market orientation can help companies understand customer needs and desires and compete effectively.

Hsieh et al. (2019) investigate the relationship between business model innovation, corporate sustainability, and business performance. This review sheds light on how competitive analysis can be used to identify sustainable business model innovation opportunities and strengthen a company's market position. Barney (2018) discusses the concept of firm resources and sustainable competitive advantage, providing a comprehensive understanding of how competitive analysis can help companies leverage their internal resources to enhance market position and create lasting competitive advantages.

Permeable Paving Blocks

Permeable paving blocks are a type of construction material that has gained significant attention in efforts to improve stormwater management and minimize negative environmental impacts. These blocks have a porous structure designed to allow rainwater to infiltrate the soil efficiently, reducing surface water pooling, and preventing erosion and environmental pollution. Additionally, the use of permeable paving blocks can alleviate the burden on urban drainage systems and enhance groundwater infiltration, which is crucial for maintaining the water cycle balance and reducing flood risks. Research by Chen et al. (2021) evaluates the impact of permeable paving blocks on storm-water flow and pollutant removal, providing insights into the benefits of using these blocks in storm-water management.

Permeable paving blocks are typically made from a mix of materials such as concrete, aggregates, and specific additives designed for water permeability. The manufacturing process involves carefully proportioning the mix, molding it into the desired shape, and drying it to achieve the necessary strength and durability. Moreover, innovations in production have led to the use of additives like recycled fiber or glass to enhance the strength and hydrophilic properties of the blocks. Li & Poon (2019) discuss the successful incorporation of recycled glass and fly ash in the production of permeable paving blocks, offering insights into the potential of alternative materials. Zhang & Ye (2020) investigates the mechanical properties and durability of fiber-reinforced permeable paving blocks, providing an understanding of how reinforcement improves performance and resilience. Additionally, Guneyisi (2018) examines the effect of using recycled bottle glass powder and fly ash on the properties of concrete paving blocks, shedding light on the potential of waste materials in the production of permeable paving blocks.

METHODOLOGY

This study adopts a mixed-method approach, combining both qualitative and quantitative techniques to evaluate the marketing strategies for increasing adoption of permeable paving blocks in environmentally conscious

markets. The research is conducted in collaboration with CV. Tekno Inti Pratama, a construction consultancy firm responsible for producing the paving blocks. The aim is to explore the effectiveness of current marketing efforts and propose potential improvements to increase consumer adoption.

The research design incorporates a SWOT analysis to assess the strengths, weaknesses, opportunities, and threats of the marketing strategy. Data collection involves a survey targeting environmentally conscious consumers, local government representatives, and construction firms. These groups provide diverse perspectives on market potential and institutional support for green construction products. Data was collected using structured surveys and in-depth interviews. Surveys provided quantitative insights into consumer behavior and perceptions, while interviews with key stakeholders offered qualitative insights into internal marketing strategies.

The analysis was conducted using both qualitative and quantitative methods. Descriptive statistics summarized consumer survey responses, while thematic analysis identified key patterns from interviews. A SWOT analysis was then performed to synthesize findings and suggest actionable strategies for improving the promotion and adoption of permeable paving blocks.

RESEARCH RESULT

SWOT Analysis for Marketing Strategy of Permeable Paving Blocks

The SWOT analysis provides a comprehensive view of the internal and external factors influencing the marketing strategy for permeable paving blocks. It highlights the strengths of the product's environmental benefits and innovation while identifying key challenges such as high production costs and limited awareness as weaknesses. Opportunities for growth lie in expanding digital marketing efforts and capitalizing on the increasing demand for sustainable infrastructure, while threats include competition from traditional materials and economic constraints. The complete description of this SWOT analysis is as follows:

Strengths:

1. Permeable paving blocks offer significant environmental benefits, including reducing surface runoff, promoting groundwater recharge, and mitigating urban flooding. These features appeal to eco-conscious consumers and align with global sustainability trends.
2. The product is innovative within the construction materials market, offering a sustainable alternative to traditional paving solutions, which gives it a competitive edge.
3. Increasing awareness of environmental sustainability creates a growing demand for eco-friendly products, which can help drive adoption.
4. Backed by comprehensive research and development from academic institutions, the product benefits from

scientific validation, which can build trust among consumers and industry stakeholders.

Weaknesses

1. The cost of producing permeable paving blocks may be higher compared to traditional materials, which could lead to a higher price point and make it less attractive for cost-conscious buyers.
2. As a relatively new product, awareness among potential customers is low, and the product has yet to achieve significant market penetration.
3. The product primarily appeals to environmentally conscious customers, which limits the broader market appeal. This niche focus may slow growth if not supported by effective marketing strategies.
4. Since permeable paving blocks are not yet mainstream, the distribution channels may be underdeveloped, requiring investment in logistics and partnerships.

Opportunities

1. Increasing government regulations and incentives promoting sustainable infrastructure and green construction projects could drive demand for products like permeable paving blocks.
2. Leveraging digital platforms, social media, and e-commerce could significantly expand product visibility and accessibility to wider audiences, particularly to environmentally conscious consumers.
3. Collaborating with construction companies focused on sustainability could help expand market reach and integrate the product into more large-scale projects.
4. Global trends toward green infrastructure in urban planning offer vast opportunities for permeable paving blocks, as cities increasingly invest in sustainable solutions to manage storm-water and urban development challenges.

Threats

1. Conventional paving solutions remain cheaper and more familiar to consumers, posing a challenge for permeable paving blocks in terms of adoption.
2. In times of economic uncertainty, consumers and businesses may prioritize cost-saving measures over investing in sustainable products, potentially slowing the adoption of higher-priced green alternatives.

3. Educating the market about the benefits of permeable paving blocks may take time, particularly in regions where sustainability awareness is still developing, which could delay broader acceptance.
4. Rapid advancements in competing green technologies or other eco-friendly materials may pose a threat to the long-term dominance of permeable paving blocks as the preferred solution for sustainable urban development.

SWOT Strategies Table

To create a SWOT Strategies Table, start by conducting a thorough SWOT analysis to identify the Strengths (S), Weaknesses (W), Opportunities (O), and Threats (T) related to your product or business. Next, combine these factors to develop actionable strategies:

1. S-O (Strengths-Opportunities): Use internal strengths to capitalize on external opportunities.
2. S-T (Strengths-Threats): Apply strengths to counteract or minimize external threats.
3. W-O (Weaknesses-Opportunities): Address internal weaknesses by leveraging external opportunities.
4. W-T (Weaknesses-Threats): Develop strategies to reduce vulnerabilities by addressing both weaknesses and threats simultaneously.

Table 1. SWOT Strategies Table for the marketing of permeable paving blocks

Strategy Type	**Strategic Approach**
S-O (Strengths-Opportunities)	- Leverage the environmental benefits of permeable paving blocks to capitalize on growing government regulations and incentives for green infrastructure projects. - Highlight the innovation and sustainability of the product through targeted digital marketing campaigns to reach eco-conscious consumers. - Form strategic partnerships with green construction companies to integrate the product into large-scale projects.
S-T (Strengths-Threats)	- Use the product's environmentally friendly and innovative features to differentiate it from traditional paving materials and overcome competition. - Promote the long-term cost benefits of reducing urban flooding and environmental damage to appeal to budget-conscious customers. - Position the product as a superior green alternative in light of the increasing demand for sustainable urban development solutions.
W-O (Weaknesses-Opportunities)	- Invest in educational campaigns to increase awareness of permeable paving blocks and demonstrate their value to consumers and businesses. - Develop partnerships with e-commerce platforms and digital

	marketing experts to expand market penetration and improve distribution channels. - Explore cost-reduction strategies by scaling production and improving efficiency to make the product more competitive in price-sensitive markets.
W-T (Weaknesses-Threats)	- Focus on reducing production costs to remain competitive against cheaper traditional materials, especially in uncertain economic conditions. - Address the lack of established distribution channels by forming strategic alliances with distributors or construction firms specializing in green infrastructure. - Diversify the marketing focus to appeal to a broader audience beyond the niche market of environmentally conscious consumers, mitigating slow market education and low adoption rates.

Key Research Findings

The research was conducted to examine the effectiveness of marketing strategies in increasing the adoption of permeable paving blocks in environmentally conscious markets. Below are the key steps and findings of the study:

1. The first step involved distributing structured surveys to 100 consumers in Manado to measure awareness of sustainable building products, including permeable paving blocks. The results revealed that almost 60% of respondents were familiar with sustainable building materials, but only less than 30% had heard of permeable paving blocks. This indicates a moderate awareness level but highlights a significant opportunity for increased promotion.
2. Several interviews were conducted with local government, construction industry professionals and local business owners. These interviews provided qualitative insights into the market's readiness for eco-friendly products. Experts highlighted several barriers to adoption, such as a lack of knowledge about the long-term benefits and higher initial costs compared to traditional paving materials. However, they also pointed to rising demand for green building solutions, especially in urban areas.
3. Based on the survey and interview data, a marketing campaign was developed, focusing on educating the public about the environmental benefits and long-term cost savings of permeable paving blocks. The campaign utilized social media, digital marketing, and on-site demonstrations at construction sites. The results of this strategy were measured by comparing pre- and post-campaign consumer interest and product inquiries.

4. Product trials were organized in collaboration with local businesses, including CV. Tekno Inti Pratama and the paving block manufacturer in Matungkas Village. These trials allowed potential customers to see the product in use. Observations during the trials revealed increased interest in the product, with 40% of attendees expressing interest in purchasing the paving blocks for future projects.
5. After the marketing campaign and product trials, sales data were collected to evaluate the effectiveness of the strategies. Sales inquiries increased by 20%, and actual sales of permeable paving blocks rose by 10% in the three months following the campaign, according to the recognition of local paving block manufacturer in Matungkas Village, indicating a successful marketing approach.

Picture 1. Product trials in Matungkas Village

Table 2. Key Research Findings

Step	Key Finding
Survey on Consumer Awareness	Almost 60% awareness of sustainable products, less than 30% awareness of permeable paving blocks
Interviews with Industry Experts	Barriers: Lack of knowledge, higher initial cost; Opportunities: Growing demand
Marketing Strategy Implementation	Increased consumer interest and product inquiries post-campaign
Product Trials and Field Observation	40% of attendees expressed purchase interest
Sales and Adoption Metrics	20% increase in inquiries; 10% increase in sales post-campaign

DISCUSSION

This research aimed to explore how sustainable innovation, specifically permeable paving blocks, can be better marketed and promoted to increase adoption in environmentally conscious markets. The findings of this study

highlight several critical factors influencing the adoption of eco-friendly products, emphasizing the importance of targeted marketing strategies, consumer education, and market positioning.

First, the success of permeable paving blocks in penetrating the market largely depends on the ability to communicate their environmental benefits effectively. As previous studies have indicated, eco-conscious consumers are more likely to purchase products that align with their values, particularly when those products address specific environmental concerns such as urban flooding and groundwater depletion (Peattie & Peattie, 2009). However, our research demonstrates that despite the growing interest in sustainable solutions, the adoption rate remains low, primarily due to insufficient consumer awareness. This finding is consistent with other research showing that even when green products have clear environmental advantages, low market penetration often stems from poor marketing communication (Kotler et al., 2020).

The role of digital marketing and social media in promoting permeable paving blocks is also significant. Our study supports the notion that leveraging digital platforms to educate consumers about the product's unique benefits can increase engagement and drive adoption. This aligns with research by Kumar & Singh (2019), which found that digital marketing enhances consumer awareness and accelerates the adoption of innovative products, particularly in niche markets. By targeting environmentally conscious audiences through strategic digital campaigns, businesses can effectively position permeable paving blocks as a superior choice over traditional materials.

Furthermore, the price point and production costs of permeable paving blocks present challenges to widespread adoption, a common issue in marketing sustainable products (Ottman, 2011). While consumers may express interest in environmentally friendly options, higher costs compared to conventional products often deter purchases. Our research suggests that addressing this barrier requires price optimization and also emphasizing the long-term cost benefits of permeable paving blocks, such as reduced maintenance and environmental damage mitigation. This strategy aligns with previous studies that emphasize the need to highlight economic as well as environmental benefits when marketing green products (Gleim et al., 2013).

In terms of competitive positioning, permeable paving blocks face competition from traditional paving solutions, which are generally cheaper and more widely available. However, by focusing on their innovation and sustainability, these products can capture a growing segment of the market that prioritizes environmental impact over initial cost. The development of strategic partnerships with construction companies and municipalities focused on green infrastructure could further enhance the product’s competitive advantage. This approach mirrors findings from studies on green infrastructure adoption, which highlight the importance of institutional support in scaling sustainable solutions (Williams & Dair, 2007).

Overall, the research findings underscore the critical role that marketing and promotional strategies play in driving the adoption of sustainable innovations like permeable paving blocks. By addressing barriers

such as cost, awareness, and competition, businesses can successfully position these products in the market and contribute to broader sustainability goals.

CONCLUSIONS AND RECOMMENDATIONS

This research has critically analyzed the potential of permeable paving blocks as a sustainable innovation in urban water management and environmental conservation. The findings reveal that while permeable paving blocks offer substantial benefits, including improved water infiltration, reduced surface runoff, and decreased urban flooding, their market adoption remains suboptimal. This issue is largely attributed to factors such as insufficient consumer awareness, high production costs, and a lack of comprehensive understanding of the long-term benefits associated with the product.

The SWOT analysis highlights that the primary strengths of permeable paving blocks include their environmental advantages and advancements in technology, which align with the growing demand for sustainable construction solutions. However, weaknesses such as higher production costs and limited consumer awareness present significant barriers to widespread adoption. Opportunities for increasing market penetration include leveraging advancements in manufacturing technologies and exploring strategic partnerships with industry stakeholders. Conversely, threats such as competitive pressure from alternative paving solutions and economic fluctuations could impact the product's market success.

To address these challenges and maximize the strengths of permeable paving blocks, several recommendations are proposed. First, it is essential to develop and implement a comprehensive marketing strategy aimed at educating consumers about the environmental and economic benefits of permeable paving blocks. This should involve targeted outreach campaigns, educational seminars, and partnerships with environmental organizations to raise awareness and drive adoption. Additionally, utilizing digital marketing platforms and social media can enhance the product's visibility and appeal to a broader audience.

Addressing production cost issues is also crucial for improving the product's competitiveness. This can be achieved by investing in research and development to identify cost-effective materials and manufacturing processes, as well as exploring the use of recycled and alternative materials to lower production expenses. Furthermore, collaboration with industry partners and leveraging government incentives can provide additional support for scaling up production and reducing costs.

Future research should focus on evaluating the effectiveness of various promotional strategies and exploring the impact of policy measures and incentives on the adoption of permeable paving blocks. By conducting studies on consumer behavior, market trends, and regulatory frameworks, stakeholders can gain deeper insights into how to better position permeable paving blocks in the market.

ADVANCED RESEARCH

While this study provided valuable insights into the marketing strategies for increasing the adoption of permeable paving blocks, it is not without limitations. First, the research was limited to a specific geographical region—Manado, Indonesia—and focused primarily on consumer behavior in that area. Thus, the findings may not fully represent the broader market conditions in other regions with different environmental awareness levels or construction trends. Additionally, the study mainly relied on surveys, interviews, and short-term sales data to measure the success of the marketing strategy. Longer-term data collection, encompassing a more extended period, would be beneficial to better understand the sustainability of consumer interest and whether the adoption rate continues to grow over time.

Future research should expand the geographical scope of the study to include diverse regions and consumer segments. This would allow for a broader understanding of how different factors—such as regional environmental policies, economic conditions, and cultural preferences—affect the adoption of environmentally friendly products like permeable paving blocks. Further studies could also explore the role of emerging technologies, such as artificial intelligence and big data analytics, in refining digital marketing strategies. Understanding how these tools can be integrated into sustainable product marketing could offer a more precise and personalized approach to targeting consumers. Finally, longitudinal research should be conducted to monitor the long-term impact of marketing campaigns on the adoption of permeable paving blocks. This will provide insights into how consumer behavior evolves over time and what additional strategies can be employed to maintain or accelerate adoption.

ACKNOWLEDGMENT

We would like to express our sincere gratitude to all those who have supported and contributed to the completion of this research on permeable paving blocks. Firstly, we extend our deepest thanks to the research team at Manado State Polytechnic, particularly to Dr. Steve Supit, whose invaluable guidance and expertise greatly shaped the direction and depth of this study. The insightful suggestions and constructive feedback were instrumental in refining the research and ensuring its relevance.

We are also grateful to CV. Tekno Inti Pratama and the paving block manufacturer in Matungkas Village for their collaboration and support in the product trials and field observations. Their willingness to engage in this project and provide practical insights was crucial for the successful implementation and evaluation of our marketing strategies.

Special thanks to our institution, Manado State Polytechnic, we acknowledge the financial support received from the Research and Community Service Center of Manado State Polytechnic, which was essential in covering the costs associated with product trials, data collection and analysis.

Finally, we would like to express our appreciation to all participants, including consumers, business owners, and industry experts, whose input was

invaluable for understanding market dynamics and improving our strategies. Their willingness to share their experiences and opinions greatly enhanced the quality of this research.

REFERENCES

Barney, J. (2018). Firm resources and sustained competitive advantage. Journal of Management, 17(1), 99-120.

Belch, G., & Belch, M. (2021). Advertising and Promotion: An Integrated Marketing Communications Perspective (12th ed.). McGraw-Hill Education.

Chen, Y., Liu, Q., & Wang, X. (2020). Sustainable concrete pavement materials: A review. Construction and Building Materials, 235.

Chen, Z., Lin, K., & Wang, D. (2021). Influence of porous paving blocks on rainwater runoff and pollutant removal: A review. Journal of Cleaner Production, 303, 126918.

Gleim, M. R., Smith, J. S., Andrews, D., & Cronin, J. J. (2013). Against the Green: A Multi-method Examination of the Barriers to Green Consumption. *Journal of Retailing*, 89(1), 44-61.

Guneyisi, E., Gesoglu, M., & Asaad, D. S. (2018). The influence of waste bottle glass powder and fly ash on the properties of concrete paving blocks. Construction and Building Materials, 159, 295-302.

Hertwich, E. G., & Peters, G. P. (2019). Carbon footprint of nations: A global, trade-linked analysis. Environmental Science & Technology, 43(16), 6414-6420.

Hsieh, Y. C., Chang, Y. C., & Lee, C. M. (2019). Unveiling the relationship between business model innovation, corporate sustainability, and business performance in the high-tech industry. Sustainability, 11(18), 5076.

Khan, F., Wang, J., & Rui, Y. (2018). Sustainable marketing strategies for green products: An empirical study. Journal of Cleaner Production, 172, 4464-4474.

Kohli, A. K., & Jaworski, B. J. (2017). Market orientation: The construct, research propositions, and managerial implications. Journal of Marketing, 54(2), 1-18.

Kotler, P., & Armstrong, G. (2019). Principles of Marketing (17th ed.). Pearson.

Kotler, P., Kartajaya, H., & Setiawan, I. (2020). *Marketing 5.0: Technology for Humanity*. Wiley.

Kumar, A., & Singh, A. (2019). Role of Digital and Social Media Marketing in Consumer Behavior: A Study of Green Products. *International Journal of Recent Technology and Engineering*, 8(3), 3225-3229.

Li, L., & Poon, C. S. (2019). The feasibility of using recycled glass and fly ash for manufacturing porous concrete paving blocks. Construction and Building Materials, 203, 456-463.

Makalew, F., & Supit, S. (2022). Diseminasi produk paving blok berpori dan disain infrastruktur pejalan kaki anak di SLB Kreasi Mandiri. *Unri Conference Series: Community Engagement*, *3*, 212-219.

Moller, K., Rajala, R., & Westerlund, M. (2021). Market-driving firms as innovation intermediaries: Opening up new market spaces through network orchestration. Journal of Business Research, 123, 66-80.

Ottman, J. A. (2011). *The New Rules of Green Marketing: Strategies, Tools, and Inspiration for Sustainable Branding*. Berrett-Koehler Publishers.

Peattie, K., & Peattie, S. (2009). Social Marketing: A Pathway to Consumption Reduction? *Journal of Business Research*, 62(2), 260-268.

Ryan, D., & Jones, C. (2019). Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation (4th ed.). Kogan Page.

Schwartz, S. H. (2019). Individual behavior and environmental sustainability. Annual Review of Psychology, 70, 53-78.

Smith, A., & Taylor, J. (2020). Marketing Communications: Offline and Online Integration, Engagement and Analytics (7th ed.). Kogan Page.

Steg, L., & Vlek, C. (2019). Encouraging pro-environmental behavior: An integrative review and research agenda. Journal of Environmental Psychology, 29(3), 309-317.

Supit, S. W. M., & Priyono. (2023). Utilization Of Modified Plastic Waste On The Porous Concrete Block Containing Fine Aggregate. *Jurnal Teknologi*, *85*(4), 143–151.

Tatuhe, G., Lukhfi, M., Mangalape, E., Mundung, S., & Supit, S. (2024). Karakteristik Paving Block Berpori Dengan Bahan Dasar Abu Terbang (Fly Ash) dari PLTU 2 Amurang Sulawesi Utara. *Prosiding Seminar Nasional Terapan Riset Inovatif (SENTRINOV)*, *9*(1), 228 - 235.

Thogersen, J. (2019). Promoting sustainable consumption: The role of marketing strategies. Journal of Business Ethics, 161(2), 353-369.

Wang, H., Chen, L., Chen, H., & Wang, Y. (2019). Application of 3D printing technology in the construction of permeable concrete pavement. Journal of Building Engineering, 25.

Williams, K., & Dair, C. (2007). What is Stopping Sustainable Building in England? Barriers Experienced by Stakeholders in Delivering Sustainable Developments. *Sustainable Development*, 15(3), 135-147.

Yang, S., Tang, Q., & Shi, J. (2021). Consumer behavior towards eco-friendly products: A systematic review. Journal of Cleaner Production, 279.

Zhang, Y., & Ye, G. (2020). Experimental study on mechanical properties and durability of porous concrete pavement block with fiber reinforcement. Construction and Building Materials, 252, 119094.