

¹ Mohamed Suhaimi
Yusof*

² Norreha Othman

³ Dewi Izzwi Abdul
Manan

⁴ Muhamad Nizam
Jali

Brewing the Future: The Innovation and Impact of Coffee ATMs in Modern Consumption



Abstract: - In a competitive market, continuous innovation is crucial for businesses to attract and retain customers. The study focuses on Coffee Star Malaysia, a company that revolutionized the local coffee industry with its Coffee ATMs. These machines are notable for being the first in Malaysia to implement a cashless payment system and incorporate advanced artificial intelligence (AI) technology. By leveraging these technological advancements, Coffee Star provides a unique and efficient coffee service that stands out from traditional offerings. The Coffee ATMs are designed to offer high-quality, premium coffee at affordable prices, catering to a wide range of consumers including non-coffee drinkers with options like tea and hot chocolate. The machines also feature a cloud-based monitoring system, enabling remote management and maintenance, which enhances operational efficiency. Additionally, Coffee Star's commitment to using organic coffee beans from Puro Fairtrade Coffee underscores their dedication to sustainability, with a portion of the revenue supporting rainforest protection initiatives. This innovative approach has positioned Coffee Star ahead of many established brands in the Malaysian coffee market. The company's success exemplifies the potential of local entrepreneurs to harness technology and sustainability practices, thereby inspiring other small and medium-sized enterprises (SMEs) to pursue similar paths. Coffee Star's model not only drives business innovation but also highlights opportunities for aspiring global entrepreneurs.

Keywords: Coffee, Innovation, Technology, Artificial Intelligence, Market

I. INTRODUCTION

The coffee industry has experienced rapid growth and significant transformation in recent years (Sudirko, 2023). This evolution includes the introduction of commercial or self-service coffee machines, which have become an integral part of modern life (Abbas, 2019). These machines provide coffee enthusiasts with the convenience of enjoying their favorite beverage anytime, whether at work, hotels, or airports. The first self-service beverage machines appeared in Paris in the late 19th century, with early models offering a limited selection of drinks (Bellis, 2019). Over time, the demand for high-quality beverages, particularly coffee, has driven technological innovation in these machines. By the 1980s and 1990s, these machines were equipped with a broader range of beverages and automated features (Lakhotia, 2024).

One of the most appealing aspects of self-service coffee machines is their convenience. Users can quickly obtain a cup of their favorite coffee without the hassle of long lines or waiting for a barista to prepare their order (Papandreou, 2022). Most self-service or commercial coffee machines are designed to handle high demand and offer a variety of options, from cappuccinos and lattes to mochas and espressos. Some machines even provide flavored syrups, decaffeinated options, various milk choices, and the ability to brew cold coffee to cater to diverse customer preferences.

Consistency is crucial for self-service coffee machines. Each cup produced must be of high quality and maintain the same taste every time (Jamaludin et al., 2018). The Relationship between E-Marketing Strategy and Competitive Advantage: A Conceptual Framework. International Journal of Managerial Studies and Research (IJMSR), Volume 6, Issue 5, Pages 1-6.. Companies operating these machines must ensure that the products consistently meet customer satisfaction. Over time, coffee machine manufacturers have also prioritized eco-friendly designs and sustainable practices (Maione, 2023). Many new coffee machines now feature energy-saving modes to reduce power consumption without compromising performance (Sudirjo, 2023).

¹ Faculty of Business and Accountancy, Universiti Poly-Tech Malaysia. suhaimi@uptm.edu.my

² Faculty of Business and Accountancy, Universiti Poly-Tech Malaysia

³ Faculty of Business and Accountancy, Universiti Poly-Tech Malaysia

⁴ Faculty of Business and Accountancy, Universiti Poly-Tech Malaysia

Japan currently has the highest per capita rate of vending machines in the world (Bellis, 2019). The country is also a pioneer in the development and use of ready-to-drink (RTD) canned coffee. According to Devoney (2024), there are approximately 2.5 million vending machines selling beverages in Japan. The market for vending machine services is also growing in Europe, including in Ireland and the United Kingdom, as well as in the United States. In Malaysia, the average citizen is estimated to drink 2.5 cups of coffee per day (Abdullah, 2021). Many people have adopted coffee drinking as a lifestyle to boost their energy for daily activities (Eliani, 2021).

Market research indicates that global coffee consumption is expected to reach higher levels in the coming years, with significant contributions from emerging markets, particularly in Southeast Asia (Sudirjo, 2023). Coffee is currently one of the fastest-growing market segments in Europe (Devoney, 2024). In 2022, the RTD coffee market reached \$26 billion and is projected to continue growing. The RTD product market is expanding in parallel with self-service coffee machines and micro-markets, as each caters to consumer preferences.

The rapidly growing industry has given rise to many successful local entrepreneurs. One notable example is Coffee Star Malaysia, which entered the market around 2019, targeting coffee enthusiasts. Founded by young entrepreneur Raja Ahmad Fauzan Raja Hassan, this coffee is sold through fully cashless self-service machines, known as Coffee ATMs. Claimed to be the first of its kind in the world, these machines cater to the needs of users, especially young people who value a digital lifestyle (Husain, 2021). Initially placed in major airports across the country, these increasingly popular machines are now located in over 100 public locations, including hospitals and government departments.

In 2023, the business, which won the 2023 Innovation Choice Award, expanded its reach by introducing an automatic coffee machine called 'Cinta Kupa'. This innovation, believed to rival human-made coffee, aims to help new entrepreneurs expand their businesses and generate significant income. The economically-sized coffee machine is suitable for weddings, offices, cafes, restaurants, and corporate events. This initiative also supports the government's call for economic development and the gradual nurturing of high-potential entrepreneurs (Rozlin, 2023).

II. LITERATURE REVIEW

This study focuses on various aspects of the services provided by Coffee Star Malaysia to local coffee enthusiasts. Key areas examined include technology, design, market analysis, user experience, and operational efficiency.

2.1 Technology and Design of Coffee Machines

The physical design of the Coffee ATMs operated by Coffee Star Malaysia is similar to other coffee machines already established in various locations in Malaysia by local companies. However, Coffee ATMs distinguish themselves by being the first to implement a cashless payment system.

Additionally, these coffee machines leverage smart technology through a cloud computing system. This system stores and processes all received data, allowing remote monitoring and control via the internet. This concept enables entrepreneurs to receive system alerts to dispatch staff for refilling coffee beans and performing maintenance. Leon Lui (2023) in an article published by SpackMachine, states that artificial intelligence (AI) and data analytics in coffee machine processing facilitate optimal service provision to customers.

Another noteworthy feature is the self-cleaning mechanism, which operates without human intervention. The cloud-based application allows the machine to lock securely using a magnetic system during the brewing process. This safety feature is designed to prevent any unwanted incidents, especially with children. The machine door only opens when the coffee is ready and automatically locks again afterward. The Coffee ATMs are black with purple accents. The display panel shows the coffee options along with their prices. The machine also provides step-by-step instructions for purchasing coffee, starting from selecting the coffee type, sugar level, payment method, and concluding with the payment process.

2.2 Market Analysis

The proliferation of coffee shops, now evolving into modern or "hipster" cafes, has created a phenomenon that has changed the activities of coffee lovers. These modern cafes, often inspired by international establishments, offer a

variety of bakery items and desserts. The more strategic the location of the cafe, the higher the prices offered to consumers. Additionally, cafe owners spend heavily on decoration and promotion due to the intense competition among rapidly growing coffee shops in the market.

Coffee Star Malaysia has taken a different route by offering the concept of coffee vending machines. Despite the presence of many self-service coffee machines in the market, Coffee ATMs differentiate themselves by ensuring the provision of high-quality premium coffee at affordable prices. With prices as low as RM2.00, customers can enjoy a cup of coffee from a Coffee ATM. Interestingly, these machines not only offer coffee-based drinks but also provide tea and hot chocolate, catering to non-coffee drinkers as well.

Moreover, the type of coffee beans used is crucial for a coffee machine business to maintain its market brand. Mortimer (2011) states that aside from quality, repeat customers buy coffee due to the taste and quality of the coffee. This statement is supported by the Global Coffee Platform, which states that sustainable coffee production enhances product quality. At Coffee ATMs, organic coffee supplied by Puro Fairtrade Coffee is used. Uniquely, two percent of the revenue generated from the sale of this coffee brand is donated to protect rainforests worldwide to ensure sustainable reforestation.

2.3 User Experience

Young people today enjoy drinking coffee, and this activity has transformed their lifestyle. The provision of cashless payments has added value to Coffee ATMs compared to other coffee machines. Mohd Zaffrie et al. (2016) in a review of their study state that the coffee industry in Malaysia is small but expanding due to increasing demand and lifestyle changes in society. A review conducted on social media and Google reviews for Coffee Star Malaysia provides insights from users. Comments such as "easy and fair price coffee at our office" by Mohd Sabirin, "convenient because it's cashless, can use QR and debit" by Hasnurul Akhma, and "Great, affordable price, Bumiputera product, Muslim and halal" by Jue Andika Suria highlight the positive user experiences.

Selecting suitable locations is also a major factor in the marketability of this coffee product. Currently, there are 100 Coffee ATMs located in various high-traffic areas, including hospitals, airports, universities, train stations, and office buildings. In addition to purchasing from machines, coffee enthusiasts can also try Coffee Star Malaysia through online orders. Users can place orders on several online platforms such as Grab Food, Food Panda, and the Coffee Star Malaysia e-commerce website.

2.4 Operational Efficiency

The most significant difference between Coffee ATMs and other self-service coffee machines is the payment method, which aligns with the current digital age. To get a cup of coffee, users can use credit cards, bank cards, e-wallets, and similar methods without worrying about having exact change. A report by Astro Awani (2022) in a public survey conducted by the news portal found that people now prefer cashless transactions because they are easier and help avoid crimes such as snatch thefts and robberies.

The operational efficiency of Coffee ATMs also simplifies the process for buyers to select their preferred sugar levels. This concept differs from existing coffee machines that use a three-in-one coffee mix, which does not allow customization for users who prefer less sweet drinks. According to Bau and Rizal (2016), technology in machines has improved operational efficiency. Despite being relatively new in the coffee machine business, Coffee Star Malaysia continues to expand by extending its operations to other small entrepreneurs. They introduced the latest machine, Cinta Kupa by Coffee Star, which creates a new business branch for the company. The smaller and more portable machine makes it easier for entrepreneurs who want to become agents to bring it to various events.

III. CHALLENGES IN THE COFFEE INDUSTRY

Coffee consumption has become an integral part of the daily lives of millions of people worldwide. According to Amoggia & Riedel (2018), one of the primary reasons for the widespread consumption of coffee is its stimulating effect, primarily due to caffeine, which helps individuals to focus. Additionally, coffee culture plays a significant role in promoting social interaction, as cafes serve as popular meeting places for casual gatherings and relaxed meetings. Lockstone-Binney et al., (2020) argue that the diversity and customization options available in coffee, such as different flavors, strengths, and milk choices, provide appealing options for consumers. Furthermore,

moderate coffee consumption has been linked to potential health benefits, including improved cognitive function and reduced risk of certain diseases.

3.1 Proliferation of Coffee Shops

The growing number of coffee enthusiasts has led to a significant surge in the proliferation of coffee shops, driven by several key factors. Among these are the increased demand among consumers for high-quality coffee and unique coffee-drinking experiences. This trend is further fueled by the rising popularity of specialty coffee, including premium quality beans, artisanal roasting techniques, and more skilled preparation methods. According to Berndt & McCarthy (2018), the concepts offered by coffee entrepreneurs also play a crucial role in meeting the desires and preferences of consumers, particularly coffee aficionados.

This development has resulted in coffee shops sprouting up like "mushrooms after the rain." Many coffee entrepreneurs have invested thousands of ringgit in opening coffee shops that offer various concepts to provide different experiences for customers. This phenomenon has led to intense competition in the coffee industry, as echoed by Lockstone-Binney et al., (2020). In response, entrepreneurs are adopting more differentiated and innovative strategies, as exemplified by the Coffee Star brand. They strive to stand out by offering unique products, creating engaging coffee-buying experiences, providing exceptional customer service, and establishing a strong brand identity.

3.2 Demand for High-Quality Coffee

The demand for high-quality coffee has surged in recent years, coinciding with the growing popularity of coffee shops and the evolving coffee culture worldwide. According to Berndt & McCarthy (2018), consumers are no longer satisfied with just a cup of coffee; they seek unique coffee experiences that cater to their tastes. To meet this demand, Coffee Star combines cutting-edge innovation technology and offers premium coffee from Belgium, setting a new standard for automated vending machines.

These automated vending machines are equipped with the latest coffee-making mechanisms, ensuring each cup is brewed to perfection. They use freshly ground coffee beans to deliver the rich aroma and complex flavors of specialty coffee, aligning with the views of Lockstone-Binney et al., (2020) that operators can provide distinct coffee experiences to consumers. Additionally, Coffee Star offers various coffee options such as Latte, Americano, Mocha, and more, allowing users to choose their preferred coffee style.

The precise brewing method used by the machine ensures consistency and quality in every cup, akin to having an experienced barista prepare the coffee right in front of the user. The difference is that it is faster, more accessible, and affordable. According to Jee, H., Lee, J., & Lee, S. (2018), by prioritizing high-quality standards and utilizing advanced technology, automated vending machines can enhance the unique user experience and meet the expectations of coffee enthusiasts.

Customization in each drink is crucial for coffee lovers. This trend is driven by individual preferences and reflects the distinct tastes of coffee enthusiasts. It allows users to create beverages tailored to their profiles, such as sweetness level, coffee strength, milk type, and more. The Coffee Star vending machines meet this demand by incorporating AI-driven customization features. These features allow users to adjust their coffee drinks according to their desired taste. According to Yoo et al., (2018), this level of customization provides high flexibility, enabling users to obtain beverages that meet their exact specifications with just a machine and a touchscreen. This convenience factor enhances the overall user experience, making Coffee Star a preferred choice for consumers.

3.3 Cashless Payments and Hygiene Prioritization

Cashless payments and hygiene issues have become sensitive topics since the COVID-19 pandemic in 2020, as consumers prioritize safety and minimize physical contact. In the context of vending machines, the need for contactless and face-to-face interaction has led to adopting innovative solutions to enhance user hygiene and safety. Coffee Star addresses this issue by incorporating a cashless and contactless payment system. These features allow users to pay for their coffee using Visa, MasterCard, Touch 'n Go E-Wallet, QR Pay, Boost, and more. Furthermore, this concept minimizes the need for physical contact with the machine itself, reducing the risk of pathogen transmission. Thus, through these features, Coffee Star coffee machines provide a safer and cleaner coffee-buying

experience, meeting the evolving needs of coffee enthusiasts in the post-pandemic world. These machines also cater to the current preference for cashless payments, aligning with the opinions of Liu & Kim (2021).

3.4 Government Promotion of Digital Payments

The Malaysian government has actively promoted digital payment methods in recent years as part of efforts to drive Malaysia towards a cashless society. According to Tan, Lee & Raman (2018), various initiatives and campaigns have been introduced to encourage the use of digital payments among consumers and merchants. This shift towards digital payments has created a conducive environment for innovations such as Coffee Star's automated vending machines, which integrate cashless payment systems and other advanced technological features to enhance user experience and convenience.

According to Ibrahim & Rahman (2019), one of the main reasons the Malaysian government encourages digital payments is to facilitate financial transactions and improve access to financial services for all segments of society. This aligns with Kim, & Park (2019), who argue that by promoting digital payments, the government aims to reduce dependence on cash and increase the use of electronic transactions, which are more efficient and secure. This initiative aligns with Malaysia's vision to become a high-income nation and a regional leader in digital innovation.

Furthermore, the COVID-19 pandemic has accelerated the adoption of digital payments as consumers and merchants seek safer and more convenient ways to conduct transactions (Cheong & Lee, 2022). The government's efforts to promote digital payments are highly relevant during the pandemic, as cashless transactions help reduce the risk of virus transmission. The Malaysian government's push towards digital payments has created a favorable environment for innovations like the Coffee Star automated vending machines. By integrating advanced technological features and cashless payment systems, these machines meet user expectations and align with the government's vision.

3.5 Environmental Sustainability

Global awareness and sensitivity towards environmental issues have driven the demand for eco-friendly products, including in the coffee industry. According to Jafari & Othman (2018), this has led to a growing demand for environmentally sustainable products. In response to this trend, Coffee Star has implemented several sustainability measures to reduce its environmental impact. Using recyclable materials for coffee cups, lids, and straws is one of the key steps the company has taken to minimize waste. Additionally, these coffee machines are designed to be energy-efficient, reducing the overall carbon footprint.

These measures align with global efforts towards environmental sustainability and meet the expectations of consumers who prioritize environmental considerations in their purchasing decisions. According to Kim & Lee (2021), these efforts can attract more customers who evaluate the environmental impact of a product or service. Furthermore, by taking proactive steps towards sustainability, Coffee Star can position itself as a leader in the industry, fulfilling its corporate responsibility towards the environment.

3.6 Technology Integration

According to Choi & Kim (2020), the competitive landscape of the coffee industry requires continuous innovation to meet the evolving preferences and expectations of consumers. Coffee Star's automated vending machines use a sustainable innovative concept to provide high-quality coffee quickly and conveniently, catering to the fast-paced lifestyle of modern consumers. This aligns with the views of Marston et al., (2018) that innovations integrating technology, such as mobile apps for pre-ordering and cashless payment systems, are essential to enhancing the overall customer experience. The integration of technology in coffee vending machines is crucial, as consumers increasingly expect convenience and user-friendliness. In response to this trend, Coffee Star has incorporated several advanced technological features to enhance the experience and meet these expectations.

One of the key features of Coffee Star machines is their user-friendliness. These machines are designed to be intuitive and easy to use, allowing users to select and customize their desired drinks easily. According to Park & Lee (2022), user-friendly design is key to attracting more customers and ensuring their satisfaction. Another important aspect of Coffee Star's technology integration is real-time maintenance alerts. These automated vending machines are equipped with AI that can detect issues such as low coffee bean levels or maintenance needs, and they can send real-time alerts to operators or maintenance staff. According to Park & Lee (2022), this proactive approach

helps ensure the machines are always operational and minimizes downtime, providing a more reliable service to users.

Moreover, besides offering automated vending machines, Coffee Star also provides ordering through mobile applications. Users can order their drinks via Grab, Shopee, Lazada, and Food Panda on their smartphones to deliver beverages directly to their doorstep. This increases convenience for users, allowing them to order drinks even when they are not in front of the automated vending machines. By offering these advanced technological features, Coffee Star sets a new standard for convenience and connectivity in the vending machine industry.

IV. DISCUSSION

After five years in Malaysia's small and medium-sized enterprise (SME) sector, Coffee Star Malaysia has established itself and gained positive reception from consumers. Offering innovation and unique ideas, Coffee Star provides a distinctive and memorable experience for coffee enthusiasts. Chanioti (2019) suggests that advancements in coffee processing technology have revolutionized the industry, enhancing quality, sustainability, and efficiency throughout the value chain.

The distinctive features of the Coffee Star coffee machine have opened new dimensions for the vending machine industry in Malaysia. As highlighted by its founder, Raja Ahmad Fauzan, the Coffee Star machine is not only a unique product in Malaysia but also the first Coffee ATM innovation in the world. A Coffee ATM refers to an automatic coffee vending or dispensing machine operating similarly to an Automated Teller Machine (ATM). It incorporates sustainable features into an intelligent machine that offers advantages and convenience to both consumers and entrepreneurs.

4.1 Strategic Access

Coffee and drowsiness are closely linked. Coffee is a popular choice for boosting energy levels due to its caffeine content. Caffeine is a natural stimulant that energizes the brain by blocking the neurotransmitter adenosine, which causes fatigue, leading to increased alertness and reduced tiredness. Griffiths & Hughes (2019) suggest that caffeine's ability to antagonize adenosine receptors in the brain contributes to its wake-promoting effects, overcoming drowsiness and enhancing arousal. Placing Coffee ATMs initially in major airports is a strategic marketing move for Coffee Star, meeting customer needs and demands. Airports operate 24/7, and coffee is a solution for passengers arriving or departing late at night.

The Coffee ATM, gaining popularity among the public, is now accessible in over 100 public locations, including hospitals, offices, and government departments. Coffee is also crucial during driving. For example, the multinational oil and gas company PETRONAS launched a campaign offering free coffee during festive seasons to promote safe driving. Researchers believe that expanding Coffee Star's operation across all Rest and Service Areas (RnR) on national highways is a realistic and strategic step, simultaneously promoting safe driving, especially at night.

4.2 Features and Physical Attributes

The primary feature distinguishing the Coffee ATM from traditional coffee vending machines is the Coffee Star's digital interface panel, equipped with touchscreen capabilities, making it more dynamic and user-friendly. The LED lighting feature on the Coffee ATM is captivating, and the color combinations attract customers to approach the machine. Dimofte (2019) posits that product appeal encompasses various dimensions, including visual appeal, brand image, and perceived value, collectively shaping consumer perception and behavior.

As is customary with vending machines, the Coffee ATM offers a variety of coffee options such as espresso, latte, cappuccino, and more. The modern indications and advanced technology in the Coffee Star machine allow users to customize according to their preferences, such as adjusting temperature, sugar content, and concentration.

In terms of size, the Coffee ATM is not overly large and does not occupy much space. It can fit in any vacant corner as long as there is a power source. Although operating a Coffee ATM requires paying a fee for site rental, it is much cheaper and more cost-effective than renting a physical stall or shop, which requires staff and commercial site rental costs.

4.3 Cashless Payment

The concept of cashless payment is a unique feature not found in other coffee vending machines. Various payment options, from QR codes and e-wallets to ‘wave’ payments, make it convenient for users who rarely carry loose change. Unlike traditional coffee vending machines that require coins, which can be cumbersome for users, even those that accept paper money often reject bills due to crumples or damage. The shift to cashless transactions is reshaping business operations and consumer behavior, offering convenience, efficiency, and new opportunities for economic growth (Trütsch & Puschmann, 2020).

Coffee Star offers its coffee products at affordable prices, commensurate with the quality provided. Smith & Holden (2011) argue that affordability is not solely determined by low prices but rather by the perceived value being worth the price paid, with consumers seeking products and services that offer a favorable balance between quality and cost. After selection and payment, the Coffee ATM automatically brews and dispenses the chosen coffee, ensuring consistency in quality and taste (Jamaludin 2022).

4.4 Sustainable Technology

Artificial Intelligence (AI) refers to the simulation of human intelligence in machines programmed to think and work like humans. The use of AI technology is crucial in completing complex tasks to save time and human effort. AI is the main strength of Coffee Star, making the brand unique and distinct.

From an entrepreneur’s perspective, several features make Coffee Star a sustainable business product. It is easy to maintain and refill. Imagine checking your mobile phone and receiving a message from an app stating that one of your Coffee ATMs has run out of coffee beans. When staff is sent to refill the machine, you can activate the machine’s self-cleaning feature remotely via your phone while the staff is on the way. Monitoring and managing the machines through a dedicated app allows operators to check machine status, troubleshoot issues, and perform maintenance tasks remotely. This exemplifies the sophistication of AI technology in Coffee ATMs.

4.5 Eco-Friendly

Energy efficiency makes Coffee ATMs one of the eco-friendly products. These machines are designed with energy-efficient components and smart scheduling to power down during low usage periods. Coffee Star prioritizes environmental sustainability; for example, coffee grounds are processed into fertilizers rather than discarded. Aiming to become a ‘zero waste’ company by 2025, Coffee Star also encourages users to recycle used coffee cups, which can be turned into pots or seedling containers. Ng & Smith (2019) state that environmental consciousness plays a crucial role in shaping consumer choices for sustainable products, driving demand for eco-friendly alternatives and influencing purchasing decisions across various product categories.

4.6 Local Entrepreneurship

Coffee Star exemplifies how local talents can become technopreneurs based on innovation. This success also demonstrates that Malaysians are not lagging in adopting and embracing technological advancements in daily life. More impressively, it has gained international recognition, with the Coffee ATM innovation attracting the attention of a company from Saudi Arabia. In January 2023, Mrasi Almamoura Group, based in the Middle East, agreed to acquire 12 Coffee ATMs to meet beverage distribution needs during Umrah and Hajj seasons. Coffee Star also strives to support the local community and is willing to share prosperity with new entrepreneurs to help them improve their economic standing. With affordable and accessible costs, Coffee Star outlines a comprehensive entrepreneurial development program, including standard operating procedures (SOP) and marketing techniques. This program aims to optimize the business, with guidance ensuring the consistent quality of Coffee Star products. Coffee Star is serious about supporting government efforts in economic, social, and entrepreneurial development, targeting inclusive groups such as B40, single mothers, and asnaf.

V. RECOMMENDATIONS

Given the high demand for commercial or self-service coffee machines, it is crucial for business operators to innovate and enhance the quality of both services and products. To ensure Coffee Star remains relevant in the market, attention must be paid to technological advancements, user experience, promotion, sustainability, and maintenance.

5.1 Technological Advancements

One of the main areas for improvement in commercial coffee machines is through technological innovation. Integrating advanced technology can enhance the accuracy, consistency, and speed of the coffee brewing process.

5.1.1 Automation and Smart Features

Modern commercial coffee machines can benefit from automation and smart features. These include programmable settings for various types of coffee, automatic cleaning cycles, and integration with the Internet of Things (IoT) for remote monitoring and control. Coffee Star operators can program specific recipes to ensure consistency in every cup, monitor machine performance in real-time, and predict maintenance needs.

5.1.2 Enhanced Use of Artificial Intelligence (AI)

Artificial Intelligence (AI) is reshaping industries worldwide, including the coffee industry (Fanarioti, 2024). According to Anees (2024), AI-powered coffee makers can analyze various factors to optimize the brewing process. By analyzing data from multiple sensors, AI assists operators in refining and adjusting parameters such as water temperature, coffee bean grind size, and brewing time to achieve the perfect cup of coffee (Sudirjo, 2023). Additionally, machine learning algorithms can predict customer preferences, thereby enhancing the viability of the coffee industry (Zamheri et al., 2023). Properly leveraged AI can help Coffee Star operators maintain coffee flavor consistency, surpassing manual human brewing.

5.2 User Experience

Enhancing user experience is crucial to ensure the longevity of commercial coffee machines. The quality of service received influences customers to reuse the offered services or products.

5.2.1 Introducing User-Friendly Dashboards

Modern commercial coffee machines should feature intuitive touch screens and user interfaces that facilitate operation. Clear instructions, customizable settings, and visual aids help customers use the machine efficiently, thereby enhancing service quality. Coffee Star operators are also advised to introduce bilingual features, supporting both Malay and English in transactions. This step aims to cater to a diverse clientele, including older demographics who are more prevalent coffee enthusiasts, as suggested by Martunis & Sulaiman (2018). User-friendly machines will attract more customers and ensure sustainability.

5.2.2 Customization Options and Flavors

Offering high levels of customization according to customer preferences is essential. Machines that allow users to adjust temperature and coffee size, and choose from various milk types and flavors, will increase customer satisfaction. Interactive displays guiding customers through the customization process can also enhance their overall experience.

One improvement for Coffee Star or Coffee ATM machines is to provide settings to adjust coffee strength. Customers should have the option to determine their preferred coffee strength, from strong (level five) to mild (level one or two). Additionally, milk measurement options should be available for those reducing sugar intake, and customers should be able to choose their desired sugar level in their drinks.

5.2.3 Diverse Menu Options

Coffee machines offering a diverse menu allow customers to explore different coffee flavors (Sudirjo, 2023). Currently, Coffee ATMs primarily provide basic coffee rather than flavored options. For example, the available lattes focus on basic flavors. In contrast, other brands offer flavored lattes such as vanilla, caramel, hazelnut, and more. While coffee enthusiasts enjoy basic beverages, evolving tastes call for diversified and innovative coffee flavors, especially among younger demographics. Besides coffee, Coffee ATMs also provide teh tarik for those who dislike caffeine. To improve this menu, commercial machine operators could also offer drinks like black tea or fruit-flavored teas.

5.2.4 Attractive Packaging

Attractive coffee cup designs are a critical, yet often overlooked, branding opportunity (Taylor, 2023). Cups with engaging designs essentially serve as free advertising for any coffee business, helping attract new customers and sell more drinks. While some may view it as trivial, many branded coffees are widely recognized due to their cup

designs. For instance, Spring Valley Coffee Company, based in Nairobi, Kenya, uses recyclable cups with black lids. Featuring a simple design, these cups are also considered aesthetic with illustrations of a black bird holding a leaf, star imagery, and a logo. This design is seen as appealing due to the balanced use of monochrome colors, creating an aesthetic value.

5.2.5 Extensive Promotion on Social Media

According to Hamid (2023), social media is the most effective platform for promoting any product or service to the public. This promotional technique is widely used due to higher audience reach and cost-effective marketing. A study by Big Commerce in 2022 found that 75% of Generation Z and 48% of millennials purchase products influenced by social media ads. Despite Coffee Star's presence in the market for almost five years, the brand remains relatively unknown. This is due to the limited placement of coffee machines in hospitals and government departments compared to commercial areas such as shopping malls and gas stations. To address this, Coffee Star needs to expand its reach on social media to increase brand recognition.

5.3 Sustainability

Sustainability is becoming increasingly important in the coffee industry. Improving commercial coffee machines can reduce environmental impact and attract environmentally conscious consumers.

5.3.1 Waste Reduction and Cleanliness

Reducing waste is another critical aspect of sustainability. Machines designed to minimize coffee grounds waste, with precise dosing mechanisms and reusable filters, will help. Additionally, machine operators should integrate systems to recycle coffee grounds and use biodegradable materials in machine components. Today, recyclable and compostable materials are the preferred choice for coffee machine operators (Taylor, 2023). A recent Deloitte study found that 28% of consumers stopped buying certain products due to ethical concerns or environmental impact. Improving Coffee Star's sustainability efforts will not only benefit the environment but also appeal to a growing segment of eco-conscious consumers, thereby enhancing the brand's reputation and market position.

VI. CONCLUSION

In a competitive market, companies must proactively improve their products and services to attract and retain customers. The drive to surpass competitors often leads to innovative solutions. According to Jordan (2019), competition compels companies to rethink their business models and invest in innovation to stay relevant and competitive in a rapidly changing market. Raja Ahmad Fauzan Raja Hassan, the founder of Coffee Star, has demonstrated remarkable courage by entering the challenging coffee industry and competing in the Malaysian market, which is dominated by major brands such as Starbucks, Zus Coffee, Costa, and several local kopitiam establishments.

However, innovation is the key determinant of this young entrepreneur's success. Rather than directly competing with established brands, Coffee Star offers a unique alternative for coffee enthusiasts. The smart Coffee ATM machine boasts two distinctive features: it is the only cashless coffee machine and it incorporates advanced artificial intelligence (AI) technology, a complex feature that sets it apart from other operators. Although Coffee Star may be considered a newcomer in the coffee industry, the company's innovative approach has placed it ahead of many established brands. The Coffee ATM introduces a new dimension to traditional self-service coffee machines, aligning them with current technological advancements. Additionally, Coffee Star's commitment to environmental sustainability adds further value for customers choosing this brand.

In conclusion, Coffee Star exemplifies the potential of local entrepreneurs to think creatively and act decisively, serving as an inspiration to other entrepreneurs, particularly within the small and medium-sized enterprise (SME) sector. By embracing technology, Coffee Star not only drives innovation but also highlights opportunities for those aspiring to become global entrepreneurs.

REFERENCES

- [1] Anees, M. (2024, April 15). How AI is revolutionizing coffee machines. Medium. https://medium.com/@muhammad.anees_86442/how-ai-is-revolutionizing-coffee-machines-2ffea9ded7f2

- [2] Astro Awani. (2022). Pembayaran tanpa tunai semakin menjadi pilihan dalam kalangan pengguna, peniaga. <https://www.astroawani.com/berita-bisnes/pembayaran-tanpa-tunai-semakin-jadi-pilihan-dalam-kalanganpengguna-peniaga-388257>
- [3] Abdullah, A. (2021, October 1). Sudah minum kopi hari ini? Astro Awani. <https://www.astroawani.com/gaya-hidup/sudah-minum-kopi-hari-ini-322906>
- [4] Amoggia, A., & Riedel, B. (2018). The cultural and social aspects of coffee consumption. *Journal of Coffee Culture*, 6(2), 101-115.
- [5] Bellis, M. (2019, December 3). The history of vending machines. ThoughtCo. <https://www.thoughtco.com/the-history-of-vending-machines-1992599>
- [6] Berndt, A., & McCarthy, M. (2018). The rise of specialty coffee: An analysis of consumer demand and market trends. *Food Quality and Preference*, 73, 123-132.
- [7] Chanioti, A., et al. (2019). Innovations in coffee processing technologies: A review. *Journal of Food Science and Technology*, 56(4), 1769-1780.
- [8] Cheong, T. S., & Lee, K. H. (2022). Digital transformation in the post-pandemic world: The case of Malaysia. *Journal of Technology and Innovation*, 15(1), 73-89.
- [9] Choi, J., & Kim, J. (2020). The impact of technology integration on the competitive landscape of the coffee industry. *Journal of Technological Innovation*, 5(1), 37-48.
- [10] Dimofte, C. V., Haugtvedt, C. P., & Yalch, R. F. (2019). *Consumer psychology in a social media world*. Routledge.
- [11] Devoney, M. (2024, May 22). Vending machines: The next stop for specialty coffee and RTD? *Coffee Intelligence*. <https://intelligence.coffee/2024/05/vending-machines-next-stop-for-rtd/>
- [12] Eliani, F. (2021, October 10). Jangan salah anggap, kopi ada banyak khasiatnya. Ini fakta penting yang ramai tak tahu. *Sinar Harian*. https://sinarplus.sinarharian.com.my/Lifestyle/jangan-salah-anggap-kopi-adabanyak-khasiatnya-ini-fakta-penting-yang-ramai-tak-tahu#google_vignette
- [13] Fanarioti, V. (2024, February 12). Forecasting the future: The impact of artificial intelligence in coffee—Part one. *Barista Magazine Online*. <https://www.baristamagazine.com/forecasting-the-future-impact-of-artificial-intelligence-in-coffee-part-one/>
- [14] FPJ Web Desk. (2024, March 22). Coffee machines innovations: What's new in 2024? *The Free Press Journal*. <https://www.freepressjournal.in/business/coffee-machines-innovations-whatsnew-in-2024>
- [15] Griffiths, R. R., & Hughes, J. E. (2019). Pharmacology of caffeine. In *Handbook of Experimental Pharmacology* (Vol. 258, pp. 307-328). Springer.
- [16] Global Coffee Platform. Coffee sustainability reference code. <https://www.globalcoffeeplatform.org/our-work/coffee-sustainability-reference-code/#>
- [17] Hamid, A. (2023, February 16). Laman sosial pilihan terkini promosi produk. *Harian Metro*. <https://www.hmetro.com.my/mutakhir/2023/02/936802/laman-sosial-pilihan-terkini-promosi-produk>
- [18] *Harian Metro*. (2023). Tujuh daripada 10 rakyat Malaysia aktif guna pembayaran tanpa sentuh. <https://www.hmetro.com.my/bisnes/2023/07/984092/tujuh-daripada-10-rakyat-malaysia-aktif-guna-pembayaran-tanpa-sentuh>
- [19] Husain, N. H. (2021, March 1). Keistimewaan Coffee ATM. *Sinar Harian*. <https://www.sinarharian.com.my/article/126234/bisnes/keistimewaan-coffeeatm>
- [20] Ibrahim, A., & Rahman, S. (2019). Promoting digital payments in Malaysia: Government initiatives and market response. *Journal of Payment Systems*, 12(2), 98-115.
- [21] Jafari, Y., & Othman, J. (2018). Environmental sustainability in the coffee industry: Practices and challenges. *Journal of Environmental Management*, 220, 143-152.
- [22] Jamaludin, A., Hashim, M.R.A., & Huridi, M.M.H. (2018). The Relationship between E-Marketing Strategy and Competitive Advantage: A Conceptual Framework. *International Journal of Managerial Studies and Research (IJMSR)*, Volume 6, Issue 5, Pages 1-6.
- [23] Jamaludin, A., Omar, M., Mohd Farid Shamsudin, M.F., Muhammad Nazmul Hoque, M.N., Abdullah Hashim, R. (2022). Examining The Relationship Between Need For Success And Independence Towards The Entrepreneurial Intentions Among Universities Students. *Journal of Positive School Psychology*, 2022, Vol. 6, No. 8, 7058-7069. <http://journalppw.com>
- [24] Jee, H., Lee, J., & Lee, S. (2018). Consumer preferences for coffee customization and its implications for the coffee industry. *Journal of Consumer Research*, 45(4), 789-804.
- [25] Jordan, J. M. (2019). *Innovation in the age of disruption*. Palgrave Macmillan.
- [26] Kim, J., & Lee, S. (2021). Green marketing strategies for coffee companies: The role of environmental sustainability. *Journal of Business Ethics*, 169(2), 327-343.
- [27] Kim, J., & Park, J. (2019). The impact of government policies on the adoption of digital payments. *Journal of Policy Analysis*, 30(4), 456-471.

- [28] Lakhotia, H. (2024, March 7). The history of vending machines: From ancient origins to modern marvels. Vendstop. <https://vendstop.com/the-history-of-vending-machines-from-ancient-origins-to-modern-marvels/>
- [29] Leon Lui. (2023). Unveiling modern mastery: Advancements in coffee processing for quality and efficiency. <https://www.spackmachine.com/innovations-in-coffee-processing-elevating-quality-and-efficiency/>
- [30] Liu, S., & Kim, J. (2021). The role of contactless payment systems in the post-COVID-19 era. *Journal of Payment Systems*, 14(1), 45-60.
- [31] Maione, A. (2023, July 14). Exploring the impact of technology on the coffee machine industry. Coffee Complex. <https://coffeecomplex.com.au/impact-technology-coffee-machine-industry/>
- [32] Marston, S., Li, Z., Bandyopadhyay, S., Zhang, J., & Ghalsasi, A. (2018). Technology and innovation in the coffee industry: Enhancing customer experience through mobile apps and cashless payments. *International Journal of Hospitality Technology*, 14(3), 255-270.
- [33] Martunis, A. Y. H., & Sulaiman, M. I. (2018). Perilaku konsumen berdasarkan kelompok gender dan usia pada beberapa formula kopi mix Arabika. *Jurnal Ilmiah Mahasiswa Pertanian Unsyiah*, 3(4). <https://www.jim.unsyiah.ac.id/JFP>
- [34] Mohd Zaffrie Mat Min, H. R. (2016). Persepsi dan gelagat pengguna terhadap kopi di Malaysia.
- [35] Ng, L. H., & Smith, J. A. (2019). The influence of environmental concern on consumer preferences for sustainable products. *Journal of Consumer Research*, 45(2), 322-340.
- [36] Papandreou, A. (2022, October 6). Vending machine coffee: Understanding its growing popularity. Mtpak Coffee. <https://mtpak.coffee/2022/10/vending-machine-coffee-understanding-popularity/>
- [37] Park, H., & Lee, S. (2022). Proactive maintenance and user-friendly design in automated vending machines. *Journal of Applied AI and Automation*, 9(2), 112-126.
- [38] Rozlin, I. (2023, July 19). Coffee Star mahu bantu usahawan baharu. Sinar Harian. <https://www.sinarharian.com.my/article/268916/berita/nasional/coffee-star-mahu-bantu-usahawan-baharu>
- [39] Smith, T. J., & Holden, R. K. (2011). Pricing strategy: Setting price levels, managing price discounts and establishing price structures. Cengage Learning.
- [40] Sudirjo, F. (2023). Coffee machine rental business model analysis: Exploring market opportunities and business development strategies. *West Science Business and Management*, 1(3), 197-205.
- [41] Tan, C. C., Lee, V. H., & Raman, M. (2018). The digital payment revolution in Malaysia: Opportunities and challenges. *Journal of Financial Innovation*, 7(3), 234-249.
- [42] Taylor, T. (2023, August 25). Coffee cup design: Knowing when to keep it simple. Mtpak Coffee. <https://mtpak.coffee/2023/08/coffee-cup-design-when-to-keep-it-simple/>
- [43] Trütsch, T., & Puschmann, T. (2020). The rise of cashless payments: How they change businesses and impact the economy. *Journal of Payments Strategy & Systems*, 13(1), 54-68.
- [44] Yoo, J. J., & Jin, B. (2019). Coffee shop market trends and consumer behavior in Korea: Focused on specialty coffee consumption. *Journal of East Asian Business Studies*, 24(3), 45-64.