

Sustainable Digital Services for Homemade Fragrances (ATTAT) in Bangladesh: Innovation and Development Pathways

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Abstract - Attar is an existing business venture in Bangladesh that is being digitalized and transformed with marketing and sustainable strategies in the context of modernization and transformation in the industry. Attar is a cheap and environmentally friendly perfume and an authentic brand that possesses the ability to compete with others because in Bangladesh, there are local brands, such as Nasreen, Attarly, and Perfumance using e-commerce and social media as a tool to bloat markets and build online communities. Finance will become more inclusive with the provision of electronic payment systems and access to better e-commerce facilities to assist micro-entrepreneurs. Sustainable and culturally resonant can be packaged as the philosophy of environmentally friendly production, world design philosophy, local craftsmanship. Powerful combinations of tradition, digitalization and sustainable marketing could recharge cultural industries and initiate development in new markets as illustrated in the current paper.

Keywords: Attar industry of Bangladesh, Cultural heritage, Digitalization, Ecommerce, Innovation, Sustainable marketing, Traditional industries

I. INTRODUCTION

The perfume industry in Bangladesh has a long-standing tradition of producing and consuming attar, a natural fragrance that holds deep cultural, religious, and social significance. Unlike synthetic perfumes, attar is highly valued for its natural ingredients, artisanal production methods, and affordability, making it accessible to a wide range of consumers while preserving traditional craftsmanship (Akhtiari, 2025; The Financial Express, 2025). Historically, marketplaces such as Baitul Mukarram have served as central hubs for attar, prayer mats, and tasbihs, reflecting the intertwined nature of cultural heritage and consumer behavior (Anika, 2024). However, the attar industry is currently experiencing a transformation as it navigates the challenges and opportunities posed by digitalization, globalization, and evolving consumer expectations. The modernization of attar businesses in Bangladesh has been significantly influenced by e-commerce and online platforms. Brands such as Nasreen's perfume ventures, Attarly, and Perfumance have embraced online retail strategies, social media marketing, and digital storytelling to reach new audiences and build engaged communities of fragrance enthusiasts (Perfumance, Bagisto; Scent of Success, TBS News; Attarly, TBS News; Dhaka Tribune, 2025). These platforms do not only offer an avenue through which the different product lines can be shown. Such a platform also allows small scale entrepreneurs to circumvent any middlemen, resulting in better access to markets and better profits. The increase of micro-entrepreneurs in the fragrance industry has also been enhanced by the rapid adoption of mobile money systems and digital payment technologies, which have enabled financial inclusion and increased access to traditional products in cities and rural markets (Dhaka Tribune, 2025; Prothom Alo, 2025). Besides the adoption of technology, contemporary production and technologies and social marketing approaches have become key elements of attar modernization. Attempts at branding attar as a sustainable or the so-called "Green product" have incorporated local

artisanship with international design aesthetics and a focus on cultural narratives and heritage conservation (DU Journal; ResearchGate, 2025; MDPI, 2025). These not only attract environmentally friendly consumers but also add value to attar in the domestic and overseas markets. Research on the reuse of knowledge, adoption of enterprise resource planning, and strategies based on the use of ICT tools prove the need to focus on the importance of technological and organizational innovations in the preservation of the traditional industry and its focus on affordable prices, cultural appeal, and accessibility (Basoglu, Daim, and Kerimoglu, 2007; Islam, 2022; Kyriakou, Nickerson, and Sabnis, 2017). Nevertheless, even amid such positive trends, the industry continues to struggle to establish structured digital strategies, at the same time save cultural identity and secure sustainable growth. The markets show that attar continues to be in the advantageous position compared to traditional perfumes, which Consumer behavior analysis indicates that the interest in the attar is supported by both offline marketplaces and online platforms, with the popularity of the brand reinforced by the presence of an online community, social media marketing, and e-commerce (both online and offline shopping) (Anika, 2024; Prothom Alo, 2025; The Daily Star, 2024; The Financial Express, 2025).

The distilled material has aesthetic value: the artisanal nature of the distillation techniques (Deg-Bhapka, etc.) means that there has been a resurgence of bioengineering and sustainability in hand-making, and there is current interest in the history of distillation and its production quality (A Fragrance Renaissance, Man's World Bangladesh, 2025). Today, the world of attar in Bangladesh is the convergence point between tradition, modernization, and ecology. Nevertheless, the industry remains with dramatic issues of digital uptake, market integration, and cultural continuity in spite of these opportunities. This poses an obvious challenge: How can the company, which deals with traditional attar products, go green in digital technology and still be authentic?

This research is also important because it can be used in the more general theoretical discourse, through the connection of digital adoption (ecommerce, mobile finance) with heritage marketing (cultural preservation, storytelling). In so doing, it links the attar business to the development of MSMEs, financial inclusion and cultural sustainability in emerging economies.

The study is aimed at achieving three objectives that can guide this research:

- To understand the way in which digital tools and platforms can be used to reshape artisanal attar businesses in Bangladesh.
- In order to determine the key opportunities and challenges of digital adoption among traditional producers.
- To suggest viable directions that would make modernization coexist with culture conservation.

Such linkages will be addressed in the paper in the context of the nexus between concepts of social marketing, e-commerce and green production intended to encourage the development of traditional fragrance businesses. The paper describes the circumstance of modernized traditional items which have realized the establishment of sustainable economic situation in the emerging marketplace of Bangladesh through the fusion of tradition and modern business hypotheses.

II. LITERATURE REVIEW

Digital adoption in traditional industries has been widely studied with a focus on improving efficiency, market access, and sustainability. Islam (2022) examined ICT-driven strategies for micro-enterprises in Bangladesh using a qualitative review of case

studies. The study identified that ecommerce platforms empower producers to bypass intermediaries, optimize operations, and reach broader markets. However, the gap lies in the limited research on culturally sensitive artisanal sectors such as attar production, where authenticity, heritage, and artisanal skills are crucial. The recommendation is to extend digital adoption strategies to artisanal industries, emphasizing tailored ICT solutions that preserve artisanal quality while enabling digital engagement. Anika (2024) and The Daily Star (2024) highlighted traditional fragrance hubs such as Baitul Mukarram and Mitford through ethnographic journalism, documenting the cultural, seasonal, and religious importance of attars in Bangladeshi society. These reports emphasize the continued relevance of physical marketplaces as social and commercial nodes. The gap lies in the absence of insights into digital adoption and online market integration. The recommendation is to align seasonal peaks and religious festivals with targeted digital marketing campaigns to boost online engagement and sales for artisanal producers. Prothom Alo (2025a) examined shifts in consumer demand for attars and identified the risks associated with counterfeit products entering the market, while Prothom Alo (2025b) explored challenges in e-commerce trust, particularly regarding product authenticity and return policies. These studies highlight gaps in quality assurance, transparency, and digital trust mechanisms for online attar sales. The recommendation is to implement batch coding, clear return policies, and digital authentication to improve consumer confidence and online transactions. The Financial Express (2025) and Dhaka Tribune (2025) focused on digital payment infrastructure and mobile money adoption, demonstrating enhanced accessibility and financial inclusion. However, the gap is a limited focus on how small-scale artisanal producers, such as attar entrepreneurs, can integrate these systems to expand their market reach. The recommendation is to provide subsidies, training, and technical support to help micro-producers effectively adopt digital payment methods and participate in e-commerce platforms. Akhtiari (2025) emphasized attar's natural ingredients, artisanal production techniques, affordability, and cultural significance, presenting it as a heritage-rich and sustainable product. The gap is that existing studies do not provide structured strategies to combine these cultural and artisanal aspects with modern digital marketing. The recommendation is to integrate storytelling and heritage-focused branding in online platforms to engage culturally conscious consumers while preserving artisanal authenticity. Nasreen's perfume ventures, Attarly, and Perfumance, documented in TBS News (2025) and Bagisto case studies, illustrate successful modernizations of attar distribution through e-commerce platforms, social media marketing, and digital community building. These cases demonstrate that online platforms enhance product visibility, consumer interaction, and niche market penetration. The gap is a lack of structured guidance for small-scale producers on operational scaling, culturally sensitive digital content creation, and knowledge management. The recommendation is to develop capacity-building programs for artisanal producers to optimize online marketing, e-commerce engagement, and storytelling strategies. DU Journal (2025) focused on rebranding traditional attar as a "green product" using social marketing strategies to boost the local cultural economy. The study highlighted how heritage products could be positioned for sustainability-conscious consumers.

The gap is limited research on applying these frameworks in Bangladesh's attar industry. The recommendation is to adapt social marketing strategies to local cultural contexts, emphasizing sustainability and artisanal authenticity. (Hendriyana et al., 2024) discussed integrating local craftsmanship with global innovation to create environmentally friendly, fashionable, and sustainable products. The gap is the minimal

exploration of such integration for traditional fragrances like attar, particularly in the context of e-commerce. The recommendation is to co-design products with artisans and designers, combining sustainability with cultural and commercial appeal for online consumers. MDPI (2025) examined how traditional costumes can inspire sustainable fashion through co-design, highlighting collaboration between designers and artisans. The gap is the limited application to the fragrance industry. The recommendation is to adopt collaborative models for attar production, ensuring artisanal input while aligning with consumer sustainability preferences. Basoglu, Daim, and Kerimoglu (2007) proposed frameworks for organizational adoption of enterprise systems, illustrating how structured technological integration can enhance efficiency, resource management, and competitiveness. The gap is the limited consideration of small-scale, culturally sensitive artisanal producers. The recommendation is to adapt these frameworks to support artisanal operations, balancing technology adoption with preservation of craftsmanship. Kyriakou, Nickerson, and Sabnis (2017) examined knowledge reuse in open design communities, demonstrating how modular frameworks can facilitate innovation while maintaining quality. The gap is the application of such frameworks to artisanal attar production. The recommendation is to create digital knowledge-sharing platforms tailored for artisans, enabling innovation without compromising heritage techniques. The Daily Star (2024) and The Financial Express (2025) highlighted the market advantages of attar over conventional perfumes, noting that affordability, cultural relevance, and accessibility contribute to consistent consumer preference. The gap is limited research on mechanisms to formalize quality control, digital marketing strategies, and consumer education for small producers. The recommendation is to integrate heritage storytelling, quality assurance, and digital adoption into training programs for artisanal producers. A Fragrance Renaissance (Man's World Bangladesh, 2025) emphasized artisanal production techniques such as "Deg-Bhapka" distillation, combined with modern packaging and branding to appeal to contemporary consumers. The gap is limited systematic research on integrating traditional craftsmanship with digital marketing, e-commerce, and sustainability. The recommendation is to adopt integrated strategies combining cultural preservation, eco-friendly practices, and online commerce. An alternative advertised perfume enterprise led by Nasreen that highlights digital marketing and online community building of attars was recorded in Scent of Success (TBS News, 2025). The disconnect is that small scale artisans have no disciplined approaches in which to emulate these achievements. The advice is to create mentorship and digital skills courses specific to traditional manufacturers. Attarly (TBS News, 2025) showed how the attar business was modernized using branding, packaging, and e-commerce. The only weakness is that little research exists on how to mainstream such practices. It has been suggested to develop scaled artisanal branding and online selling frameworks. Perfumance (Bagisto) demonstrated the application of e-commerce platform in offering ethanol-free perfumes and attars in Bangladesh, with a focus on technology in product display and handling various collections. The difference is that only one case is available in terms of insights. The suggestion is to recreate platform-based strategies of several small industry producers in order to position themselves better in the market, as seen in the article by the Dhaka Tribune (2025) that talks about the community of fragrance-loving people on social media that share information about products and brands and help each other with bringing them to the market regarding awareness. The development gap is the absence of formalized digital marketing approaches to artisanal attars. Social media activities with informational content about craftsmanship and sustainability were recommended, and the quality and authenticity of the product, as well as problems in

consumer trust in digital transactions, were understood in Prothom Alo (2025a) and (2025b). The disjuncture is restricted to assimilation of this revelation into electronic tactics among minor manufacturers. The recommendation is to implement transparent online processes, authenticity verification, and consumer education campaigns. In summary, existing literature and media sources collectively highlight the potential of digital services, social marketing, sustainability practices, and ecommerce platforms to revitalize traditional industries. However, significant gaps remain in contextualizing these opportunities for artisanal attar producers in Bangladesh. The consistent recommendation across studies is the development of culturally sensitive, heritage-oriented, sustainability-driven digital adoption strategies, supported by capacity-building, standardized quality assurance, e-commerce integration, and knowledge sharing platforms. Such integrated approaches provide a comprehensive framework for preserving cultural heritage, expanding market reach, and ensuring sustainable economic growth for the attar industry in Bangladesh. Nevertheless, regardless of these observations, the role of research is not developed in contemporary literature. Thus, the purpose of the research will be to investigate the ways of sustainable digital integration in the attar industry of Bangladesh, which will guarantee the cultural and increased accessibility of the market and the competitive nature of the industry in the long term. The following research objectives will be used to fill the identified gaps:

- With the aim of investigating the ways in which digital platforms, ecommerce, and mobile payment systems can be used to assist artisanal attar producers in increasing the market reach.
- To determine sustainability-oriented and locally based branding approaches to attar manufacturers in online environments.
- To offer a comprehensive development model that integrates cultural heritage, sustainable development, and digital innovation to the artisanal attar entrepreneurs in Bangladesh.

III. METHODOLOGY

This paper uses a conceptual literature-based research approach supported by secondary research study of recent articles in major national newspapers, case studies, and industry reports. The aim is to consider the impact of digital adoption, social marketing, and sustainability practices on the traditional attar industry in Bangladesh and identify the challenges and opportunities of the artisan's producer. The framework assumes that digital adoption positively influences operational efficiency, market reach, and consumer engagement, while being moderated by barriers such as literacy gaps, financial limitations, technological access, and authenticity concerns (Islam, 2022; Dhaka Tribune, 2025; Prothom Alo, 2025a). The primary sources of data include peer-reviewed academic articles, industry reports, case studies, and journalistic coverage of the attar industry in Bangladesh. Academic references such as Basoglu, Daim, and Kerimoglu (2007), Kyriakou, Nickerson, and Sabnis (2017), Islam (2022), and studies published in DU Journal (2025), ResearchGate (2025), and MDPI (2025) provide insights into digital adoption frameworks, enterprise system implementation, knowledge reuse, and sustainable product design. These sources allow the study to conceptually model the relationship between technology adoption and cultural preservation in artisanal sectors.

Secondary sources include recent articles from national newspapers and online publications such as The Daily Star (2024), Dhaka Tribune (2025), Prothom Alo (2025a, 2025b), The Financial Express (2025), Man's World Bangladesh (2025), and TBS News

(2025). These sources document contemporary developments in attar production, marketing practices, consumer behavior, and e-commerce adoption. They offer the current evidence concerning the trends of digitalization and market challenges and opportunities of artisanal producers, including the examples of ventures led by Nasreen, Attarly and Perfumance (Bagisto). By synthesizing these secondary data, the study bridges academic theories with real-world industry developments.

The methodology employs conceptual analysis to develop a theoretical framework that links digital adoption, social marketing, and sustainability with outcomes such as market expansion, efficiency, and consumer engagement. This approach involves systematically reviewing literature to identify recurring themes, patterns, and insights relevant to the Bangladeshi attar industry. Key variables analyzed include digital adoption (measured through the use of e-commerce platforms, social media, and online marketplaces), social marketing practices (brand storytelling, heritage-based promotion, and digital campaigns), and sustainability practices (environmentally friendly production techniques, artisanal authenticity, and heritage preservation). Secondary analysis of newspaper articles and case studies is used to contextualize theoretical insights within contemporary industry developments. Articles by Anika (2024), The Daily Star (2024), and Akhtiari (2025) illustrate cultural significance, market dynamics, and artisanal practices in fragrance hubs such as Baitul Mukarram and Mitford. Prothom Alo (2025a, 2025b) and Dhaka Tribune (2025) provide evidence of consumer behavior, e-commerce adoption, payment infrastructure growth, and challenges related to trust and authenticity. Case studies of Nasreen's perfume ventures, Attarly, and Perfumance (Bagisto) highlight practical applications of digital marketing, product visibility, and operational scaling, demonstrating how theory translates into practice. The conceptual framework is constructed by synthesizing insights from academic and secondary sources to illustrate the interrelationships between digital adoption, social marketing, and sustainability. Digital adoption is assumed to improve market reach, operational efficiency, and consumer engagement, while social marketing reinforces brand perception, cultural relevance, and product visibility. Sustainability practices act as a complementary factor, ensuring that artisanal methods are preserved, and environmental responsibility is maintained. The framework also accounts for moderate factors such as financial constraints, technological access, literacy, and authenticity concerns, which can hinder the effective implementation of digital strategies (Prothom Alo, 2025a; The Financial Express, 2025). This methodology emphasizes a literature-driven synthesis, integrating qualitative insights from case studies and media reports with theoretical perspectives from peer-reviewed articles. This approach allows for identification of gaps in existing research, including limited exploration of culturally sensitive digital adoption strategies, insufficient consumer trust mechanisms in online marketplaces, and the underutilization of social marketing for artisanal products. It also provides actionable recommendations for enhancing digital engagement, promoting sustainable practices, and preserving cultural heritage in the attar industry. Data analysis within this methodology involves thematic coding of secondary sources to extract patterns and themes relevant to digital adoption, marketing strategies, and sustainability. Themes identified include technological integration (ecommerce platforms, social media, and online marketplaces), consumer trust and authenticity, cultural preservation, affordability and accessibility, and operational challenges faced by small-scale producers. Cross-referencing academic studies with real-world examples from newspapers and case studies strengthens the reliability of the framework, ensuring that the conceptual model reflects both theory and practice.

It must be said that this research did not entail any human or animal subjects. The complete data were obtained on the basis of publicly available materials, such as peer-reviewed publications, case studies, and credible press releases, which confirm complete transparency, ethical behavior, and cultural practice of respect. Ethical considerations are inherent in the secondary analysis approach, as the study relies exclusively on publicly available sources, including peer-reviewed publications and reputable media reports. References are given where the case is made, and no speculative statement is made about the case regarding individual producers, or individual consumers. The study ensures that cultural practices, artisanal traditions, and industry stories are used in a respectful and appropriate way. The study, in general, utilizes the conceptual, literature-based approach and provides secondary analysis of the recent national newspaper coverage, case studies, and projects in the industry. This approach enables the development of a theoretical framework linking digital adoption, social marketing, and sustainability to such outcomes as market penetration, efficiency of operations, and cultural conservation. Moderating factors are addressed by different barriers such as limited finances, lack of literate knowledge, access to technology, and other factors that involve insensitivity to authenticity. Incorporating the data provided by 23 primary sources, including academic literature and industry reports, but also media sources, the methodology will enable to create a solid foundation according to which the contemporary trends in the Bangladeshi attar industry can be defined and provide useful recommendations that can be extended to artisanal manufacturers.

IV. RESULTS AND DISCUSSION

A. Opportunities

Online markets enhance their sales and profits: Online shops provide the artisanal attar makers the opportunity to bypass middlemen and contact a greater number of consumers locally and internationally (Islam, 2022; The Financial Express, 2025). Micro-creative apps such as Bagisto-powered Perfumance demonstrate how small manufacturers can showcase a collection of numerous attars, keep a product catalog and expand operations without having to shift towards a purely offline market (Bagisto; TBS News, 2025). Studies observe that adoption of e-commerce increases its visibility and is able to have direct contact with its customers, which increases its sales and revenues potential (Dhaka Tribune, 2025; Prothom Alo, 2025b). Furthermore, the research of ICT based practices towards micro-enterprises in Bangladesh shows that digital adoption can aid such enterprises in expanding their market at a low cost and, hence, enable the producer to reach consumers not only within their physical area but also beyond (Islam, 2022). However, not all the attempts at digitization have worked out because of insufficient training or funding, which proves that the adoption of ecommerce does not work equally well with all artisanal producers.

Social media marketing helps communicate authenticity and engage younger buyers: Social media platforms like Facebook and Instagram allow producers to engage with digitally savvy consumers, communicate heritage, and highlight artisanal methods (Anika, 2024; Prothom Alo, 2025b). Case studies of Attarly and Nasreen's perfume ventures illustrate how storytelling around craftsmanship, natural ingredients, and heritage techniques strengthens brand identity while appealing to younger buyers who value sustainability and authenticity (TBS News, 2025; Akhtiari, 2025). This aligns with DU Journal (2025) findings that heritage branding combined with digital campaigns can successfully position attar as a culturally significant and environmentally conscious product. Social media marketing also provides a low-cost avenue for community

building, enabling producers to maintain consumer loyalty while promoting artisanal skills and environmentally friendly practices (Hendriyana et al., 2024); Man's World Bangladesh, 2025). Nonetheless, the success of social media marketing may be unequal on the basis of the levels of familiarity of consumers with digital products, and there are chances that some elderly consumers will be more inclined to communicate with the marketplace in the conventional way.

Mobile payments improve efficiency and financial transparency: The adoption of mobile payment systems supports operational efficiency and secure financial transactions, particularly for small-scale producers with limited access to formal banking (Dhaka Tribune, 2025; The Financial Express, 2025). Mobile money enables timely receipt of payments, reduces dependence on cash, and ensures transparent transactions, which is essential for building consumer trust in e-commerce environments (Islam, 2022). The implementation of mobile payment systems complements online marketplaces, as producers can process orders efficiently and scale operations without the need for complex financial infrastructure. Studies also indicate that digital financial inclusion supports micro-enterprises in managing costs, tracking revenue, and expanding market reach (Dhaka Tribune, 2025; Prothom Alo, 2025b). Other artisans, however, like the old-fashioned textiles or handicraft producers have had issues with such digital payment systems because of a lack of mobile connections in the rural regions, suggesting boundaries to the generalizability of such suggestions.

B. Challenges

Low digital literacy hinders adoption: Many traditional attar producers lack the technical knowledge required to operate e-commerce platforms, social media campaigns, and online payment systems effectively (Sultana, 2023; Prothom Alo, 2025b). This literacy gap limits the full potential of digital adoption, particularly among older or less educated artisans who are more comfortable with conventional marketing methods. Qualitative insights from local markets like Baitul Mukarram and Mitford reveal that while producers recognize the benefits of digital tools, the lack of technical skills often prevents them from leveraging online opportunities fully (Anika, 2024; The Daily Star, 2024). Instances of failed digitization in similar sectors highlight that training alone may not be sufficient, and supportive infrastructure is also needed to ensure adoption.

Financial constraints limit investment in digital infrastructure: Many small-scale producers face resource limitations, which restrict their ability to invest in website development, digital marketing, social media campaigns, or secure payment systems (Dhaka Tribune, 2025; The Financial Express, 2025). Financial limitations can result in partial or inefficient adoption of digital tools, where producers may rely on social media alone without integrating complete e-commerce solutions. As observed in case studies of Nasreen's ventures and Perfumance, initial investment and ongoing operational costs can be a barrier for artisanal enterprises seeking to scale their digital presence (TBS News, 2025; Bagisto). This issue also appears in other artisanal industries like traditional handicrafts, suggesting broader applicability of financial support measures.

Cultural authenticity risks if commercialization undermines artisanal identity: Expanding digital reach and e-commerce adoption may inadvertently compromise the traditional and cultural authenticity of attar products (Prothom Alo, 2025a; Akhtiari, 2025). Traditional production techniques such as "Deg-Bhapka" distillation and handcrafted packaging embody artisanal knowledge passed down through generations (Man's World Bangladesh, 2025). Over-commercialization and standardization for digital markets could dilute these practices, potentially reducing the perceived value of

altars among culturally conscious consumers (Anika, 2024; The Daily Star, 2024). Analogs in digitization in the textile industry boast about the same strains between modernization and retention of the old ways, and they demonstrate the constraints on universal implementation of digital measures.

Operational and quality control challenges: Managing inventory, ensuring batch consistency, and maintaining product quality in an online environment presents significant challenges (Prothom Alo, 2025b; The Financial Express, 2025). Producers must adopt standardized batch-coding systems and transparent supply chain mechanisms to prevent misrepresentation or counterfeit products in digital marketplaces, a challenge highlighted in studies on e-commerce trust (Prothom Alo, 2025b). Failure to implement these systems in other artisanal industries has led to consumer mistrust, emphasizing the need for robust procedures.

C. Pathways for Sustainable Integration

Digital Literacy Programs to train producers: Structured training programs are essential to equip artisans with the skills necessary for effective e-commerce management, social media marketing, and digital financial transactions (Islam, 2022; Prothom Alo, 2025b). Workshops, online tutorials, and peer-to-peer learning can bridge technical gaps, empowering producers to fully utilize digital tools while maintaining artisanal authenticity. Evidence from similar sectors supports that comprehensive literacy programs significantly improve digital uptake and reduce failed adoption attempts.

Low-Cost Tools such as mobile-first platforms: Adopting affordable, user-friendly digital solutions enables small producers to participate in online marketplaces without significant financial investment (Dhaka Tribune, 2025; The Financial Express, 2025). Mobile-first platforms, simplified content management systems, and integrated payment options allow producers to manage product listings, communicate with consumers, and process transactions efficiently, minimizing barriers to entry.

Storytelling & Branding to highlight heritage: Leveraging social media and digital marketing to share narratives about artisanal techniques, natural ingredients, and environmental sustainability strengthens brand value and consumer engagement (DU Journal, 2025; Hendriyana et al., 2024; Anika, 2024). Case studies such as Attarly and Nasreen demonstrate the efficacy of storytelling in conveying authenticity, heritage, and artisanal skill while appealing to modern consumer preferences (TBS News, 2025; Akhtiari, 2025). This strategy also aligns with sustainable marketing practices that emphasize cultural preservation and environmental responsibility (MDPI, 2025; Man's World Bangladesh, 2025). However, some contexts might not be as generalizable because the success of such storytelling campaigns might depend on the level of market maturity, social media penetration, and the level of consumer literacy.

Policy Support for MSMEs: Government and non-government initiatives can facilitate digital adoption, financial access, and capacity building for small producers (Prothom Alo, 2025b; The Financial Express, 2025). Policy measures may include subsidies, training programs, infrastructure support, and regulatory frameworks that protect artisanal knowledge and promote e-commerce participation. Such support ensures long-term growth while safeguarding cultural and environmental values inherent in attar production. The cross-sectoral comparisons show that comparable policy interventions in textiles and crafts have been successful and therefore, it is less surprising that they are applicable to artisanal SMEs, but it also reveals that they adapt locally.

V. LIMITATIONS AND FUTURE WORK

This study is conceptual and relies primarily on secondary sources, including peer-reviewed literature, case studies, industry reports, and national newspaper articles (Islam, 2022; Basoglu, Daim, & Kerimoglu, 2007; Kyriakou, Nickerson, & Sabnis, 2017; DU Journal, 2025; (Hendriyana et al., 2024; MDPI, 2025; The Daily Star, 2024; Anika, 2024; Akhtiari, 2025; Prothom Alo, 2025a, 2025b; Dhaka Tribune, 2025; The Financial Express, 2025; Man's World Bangladesh, 2025; TBS News, 2025; Bagisto). While these sources provide comprehensive insights into digital adoption, social marketing, sustainability practices, and artisanal production, they do not capture primary, on-the-ground perspectives of attar producers, consumers, or other stakeholders, which limits the depth of understanding of real-world challenges and opportunities (Islam, 2022; Anika, 2024; The Daily Star, 2024). Furthermore, the study lacks quantitative metrics, making it difficult to empirically validate relationships between digital adoption, social marketing, and sustainable outcomes (Dhaka Tribune, 2025; The Financial Express, 2025; Prothom Alo, 2025b). Reliance on media reports and online case studies (Akhtiari, 2025; TBS News, 2025; Bagisto; Man's World Bangladesh, 2025) may introduce publication bias, as successes are often highlighted while operational failures, financial constraints, or authenticity challenges may be underreported (Prothom Alo, 2025a, 2025b; The Daily Star, 2024). Additionally, the findings are context-specific to the Bangladeshi attar industry, which may limit generalizability to other artisanal sectors or regions where cultural practices, technological infrastructure, and market dynamics differ (DU Journal, 2025; ResearchGate, 2025; MDPI, 2025; Anika, 2024). The absence of longitudinal data also constrains understanding of evolving digital adoption trends, consumer behaviors, and long-term sustainability impacts (Islam, 2022; Dhaka Tribune, 2025; The Financial Express, 2025). To address these limitations, future research should integrate primary empirical methods, including surveys, interviews, and participatory observations with attar producers, consumers, and stakeholders, alongside comparative studies with other artisanal industries such as traditional textiles, cosmetics, or sustainable fashion (Islam, 2022; Prothom Alo, 2025b; TBS News, 2025; DU Journal, 2025; MDPI, 2025; ResearchGate, 2025). Quantitative analyses measuring financial performance, market reach, and environmental or cultural outcomes can strengthen empirical validity, while assessments of digital literacy interventions, policy support, and storytelling-based branding can guide actionable strategies (Dhaka Tribune, 2025; The Financial Express, 2025; Prothom Alo, 2025b). Additionally, future work should incorporate metrics to evaluate how digital adoption affects cultural authenticity, heritage preservation, and environmentally responsible practices, ensuring that technology integration does not compromise artisanal identity or sustainability principles (Man's World Bangladesh, 2025; DU Journal, 2025; ResearchGate, 2025; Akhtiari, 2025; Anika, 2024; The Daily Star, 2024). In summary, while this study provides a comprehensive conceptual understanding of digital adoption, social marketing, and sustainability in Bangladesh's attar industry, its reliance on secondary sources, lack of primary empirical data, and context specificity highlight the need for future research that combines empirical investigation, cross-sector comparisons, longitudinal analysis, and evaluation of cultural and environmental outcomes to offer actionable guidance for sustainable digital integration in artisanal sectors (Islam, 2022; Basoglu, Daim, & Kerimoglu, 2007; Kyriakou, Nickerson, & Sabnis, 2017; DU Journal, 2025; ResearchGate, 2025; MDPI, 2025; The Daily Star, 2024; Anika, 2024; Akhtiari, 2025; Prothom Alo, 2025a, 2025b; Dhaka Tribune, 2025; The Financial Express, 2025; Man's World Bangladesh, 2025; TBS News, 2025; Bagisto).

VI. CONCLUSION

Sustainable digital services can transform Bangladesh's home-made attar industry by enhancing efficiency, expanding market access, and promoting cultural preservation. The integration of e-commerce platforms enables small-scale producers to reach a wider consumer base, bypass traditional intermediaries, and increase revenues, as demonstrated in Islam (2022) and The Financial Express (2025). Case studies such as Bagisto-powered Perfumance and brands like Attarly and Nasreen's perfume business illustrate practical applications of digital adoption, where producers manage diverse collections, engage directly with consumers, and strengthen brand visibility beyond local markets (Bagisto; TBS News, 2025). Social media platforms such as Facebook and Instagram complement e-commerce by allowing producers to share narratives about traditional distillation techniques, natural ingredients, and artisanal craftsmanship, fostering consumer engagement and loyalty while maintaining authenticity (Anika, 2024; Prothom Alo, 2025b; The Daily Star, 2024). Insights from DU Journal (2025) and ResearchGate (2025) suggest that storytelling and heritage-based branding not only strengthen market competitiveness but also preserve artisanal knowledge, aligning with sustainable practices highlighted in Man's World Bangladesh (2025). Mobile payment systems further contribute to efficiency and transparency, offering secure and timely transactions while reducing reliance on cash and formal banking infrastructure (Dhaka Tribune, 2025; The Financial Express, 2025). ICT-driven solutions, including mobile money, empower micro-enterprises to overcome logistical challenges, improve financial management, and integrate seamlessly with online marketplaces (Islam, 2022). Together, e-commerce, social media marketing, and mobile payments form a comprehensive digital framework that can elevate the economic viability, operational efficiency, and sustainability of the attar sector (Prothom Alo, 2025b). However, several barriers must be addressed to ensure effective adoption. Low digital literacy limits producers' ability to utilize e-commerce platforms, social media tools, and mobile payment systems, particularly among older or less-educated artisans (Sultana, 2023; Prothom Alo, 2025b). Financial constraints further hinder investments in digital infrastructure, marketing, and inventory management, restricting small-scale producers' participation in online markets (Dhaka Tribune, 2025; The Financial Express, 2025). Cultural authenticity remains a critical concern, as commercialization for digital platforms may compromise artisanal identity and traditional production methods such as "Deg-Bhapka" distillation or handcrafted packaging (Man's World Bangladesh, 2025; Akhtiari, 2025; Prothom Alo, 2025a; Anika, 2024). Traditional marketplaces like Baitul Mukarram and Mitford are not only commercial centers but also cultural hubs, transmitting artisanal knowledge across generations, highlighting the importance of balancing digital expansion with heritage preservation (The Daily Star, 2024; Prothom Alo, 2025a). Operational challenges, including quality control, batch consistency, and inventory management, further necessitate targeted training and support for smaller producers (Prothom Alo, 2025b; TBS News, 2025; Bagisto). Pathways for sustainable digital integration include digital literacy programs, which can equip producers with the necessary skills to manage online platforms, social media marketing, and mobile financial systems (Islam, 2022; Prothom Alo, 2025b). Low-cost, mobile-friendly platforms and simplified content management systems allow micro-enterprises to participate in e-commerce without significant financial burden (Dhaka Tribune, 2025; The Financial Express, 2025). Storytelling and heritage-focused branding highlight cultural authenticity and environmental responsibility, creating a competitive advantage in a digitally connected market (DU Journal, 2025; ResearchGate, 2025; Anika, 2024;

TBS News, 2025; Akhtiari, 2025). Policy support, including training initiatives, subsidies, infrastructure development, and regulatory frameworks, can further enhance adoption and ensure long-term sustainability for micro and small producers (Prothom Alo, 2025b; The Financial Express, 2025). In summary, while sustainable digital services present clear pathways for growth, their successful adoption in Bangladesh's home-made attar industry depends on addressing literacy gaps, financial limitations, operational challenges, and authenticity concerns. By combining digital literacy programs, accessible technology solutions, storytelling-driven branding, and policy support, producers can enhance efficiency, expand market reach, and preserve cultural heritage, enabling a sustainable and culturally authentic digital transformation for the industry (Islam, 2022; Basoglu, Daim, & Kerimoglu, 2007; Kyriakou, Nickerson, & Sabnis, 2017; DU Journal, 2025; Anika, 2024; Akhtiari, 2025; Prothom Alo, 2025a, 2025b; Dhaka Tribune, 2025; The Financial Express, 2025; Man's World Bangladesh, 2025; TBS News, 2025; Bagisto).

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