

Original Article

Bangladesh's Pharmaceutical Sector: Marketing Dynamics and Industry Advancement

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Abstract: Bangladesh's pharmaceutical industry has achieved a remarkable transformation, evolving from a largely import-dependent sector to one that now fulfills 98% of its domestic demand and exports to over 150 countries. Valued at approximately \$3.5 billion in 2023 and projected to exceed \$6 billion by 2025, this sector stands as a critical pillar of the national economy, demonstrating a robust annual growth rate of 15-18%. Marketing within this sector traditionally relies heavily on personal selling by medical representatives (MRs) and direct engagement with healthcare professionals (HCPs) through various incentives, including samples, gifts, and educational events. This study determined the marketing dynamics & Industrial advancement in Bangladesh's Pharmaceutical Sector. While digital marketing is emerging as a more cost-efficient and targeted approach, the industry continues to navigate complex ethical concerns surrounding promotional practices and the challenges of regulatory enforcement. Key drivers of the industry's growth include the World Trade Organization's (WTO) Trade-Related Aspects of Intellectual Property Rights (TRIPS) waiver, which has historically facilitated generic drug production, alongside protective national drug policies and government incentives aimed at bolstering Active Pharmaceutical Ingredient (API) manufacturing. The sector also benefits from a substantial, cost-competitive workforce and increasing domestic healthcare expenditure. However, the impending expiration of the TRIPS waiver, persistent reliance on imported APIs (90-95%), existing infrastructure limitations, and a shortage of skilled research and development (R&D) professionals present notable challenges. The efficacy of ethical marketing practices and regulatory oversight also requires continuous strengthening. To ensure sustained growth and solidify its position as a global pharmaceutical powerhouse, Bangladesh must strategically accelerate local API production, diversify its export markets, enhance regulatory enforcement, invest in human capital and advanced manufacturing technologies (such as Industry 4.0 and biologics), and foster robust public-private partnerships.

Keywords: pharmaceutical sector, marketing, dynamics, industry advancement

1. INTRODUCTION: BANGLADESH'S PHARMACEUTICAL SECTOR - A GLOBAL CONTENDER

Bangladesh's pharmaceutical industry has undergone a profound metamorphosis, transitioning from a state of heavy reliance on imports to achieving near self-sufficiency in meeting its domestic medical needs [1]. This remarkable journey began in the early 1980s, when the sector was largely dependent on foreign pharmaceutical products, with imports accounting for approximately 80% of the country's drug requirements between 1972 and 1982. The landscape dramatically shifted following the promulgation of the Drug Control Ordinance 1982 and the subsequent National Drug Policy (NDP) of 1982 [2]. These foundational policies were instrumental in reorienting the market, significantly reducing the dominance of multinational corporations (MNCs), which held a 75% market share in 1982, in favor of local firms, which by 2010 had captured an impressive 80% of the market. The NDP's core objectives

were ambitious yet clear: to ensure the availability of affordable essential drugs for citizens, progressively reduce the import and production of costly medications, achieve self-sufficiency in essential drug manufacturing, and prohibit the circulation of ineffective or harmful drugs. Furthermore, it aimed to establish governmental control over drug advertising and the import of raw materials [3]. The rapid progression from import dependency to a state of near self-sufficiency is a testament to a deliberate and protectionist government policy. This trajectory stands as a compelling illustration of successful industrial policy intervention, particularly as it challenged prevailing global economic principles that typically advocated for unfettered market liberalization and stringent patent protections [4]. By strategically restricting foreign firms and actively promoting local manufacturing, Bangladesh created an environment where its nascent pharmaceutical industry could not only survive but thrive. This approach demonstrates that for sectors deemed strategically vital in developing economies, active state intervention, even when deviating from conventional free-market dogmas, can be a potent catalyst for industrial development and national self-reliance [5]. The industry's current valuation stands at approximately \$3.5 billion as of 2023, with projections indicating it will surpass \$6 billion by 2025. This growth is underpinned by a robust annual rate of 15-18%, with recent data for Q1 MAT 2025 reflecting a 17.3% year-on-year growth. The pharmaceutical sector is a cornerstone of the national economy, contributing approximately 1.8% to the Gross Domestic Product (GDP) and ranking as the second-highest contributor to the national exchequer, only after the ready-made garment (RMG) industry [6]. Furthermore, it is recognized as the largest white-collar employment sector in the country, directly employing over 200,000 individuals and indirectly supporting thousands more. The pharmaceutical sector's impressive growth and substantial economic contribution, particularly its position as the second-largest revenue generator after RMG, underscore its critical role in enhancing Bangladesh's overall economic resilience and its efforts towards diversification [7]. Unlike the labor-intensive RMG sector, the pharmaceutical industry is knowledge-based and high-tech, offering higher-value employment opportunities. This signifies a crucial diversification of the national economy, reducing its over-reliance on RMG exports and thereby bolstering its capacity to withstand external economic shocks [8]. The expansion of this sector is thus a key driver in Bangladesh's transition towards a more developed economic status, creating a more robust and varied employment landscape. Bangladeshi pharmaceutical companies currently meet an impressive 98% of the nation's domestic demand for medicines. Beyond domestic self-sufficiency, the industry has significantly expanded its global footprint, exporting pharmaceutical products to over 150 countries worldwide, including highly regulated markets such as the USA, UK, Germany, Canada, France, and the EU [9]. Export earnings reached \$205.48 million in FY2023-24, marking a 17.3% increase. Key export destinations include Sri Lanka, Pakistan, and Kenya. While the broad export footprint is commendable, a closer examination reveals a strategic market segmentation. The current widespread export success is largely driven by the affordability and generic nature of Bangladeshi products, which are highly attractive to less regulated markets in regions like Africa, Latin America, and parts of Asia, where entry barriers are lower [10]. However, the industry's increasing focus on highly regulated markets like the USA and EU signifies a strategic ambition to elevate its global standing and move up the value chain. This pursuit, while challenging due to stringent compliance requirements and intense competition, demonstrates a commitment to quality and innovation. The current export strategy thus involves a dual approach: maintaining strong presence in accessible markets while simultaneously making targeted, substantial investments in areas such as Good Manufacturing Practices (GMP) compliance and establishing bioequivalence testing facilities to penetrate and expand in more demanding regulated markets. This nuanced approach is crucial for Bangladesh to truly enhance its global competitiveness and sustain its growth beyond the advantages afforded by its Least Developed Country (LDC) status [11]. The following table provides a comprehensive overview of Bangladesh's pharmaceutical market size and growth projections, illustrating the sector's remarkable trajectory:

Table 01: Bangladesh Pharmaceutical Market Size and Growth Projections

Metric	Value/Projection	Source/Year
Market Size (USD Billion)	0.025	(1982)
Market Size (USD Billion)	1.5	(2016)
Market Size (USD Billion)	3.0	(June 2020/2022)
Market Size (USD Billion)	3.5	(2023)
Market Size (USD Billion)	6.0 (Projected)	(by 2025)
Annual Growth Rate (%)	15-18%	
Annual Growth Rate (%)	17.3%	(Q1 MAT 2025)
Domestic Demand Met (%)	98%	
Export Value (USD Million)	169	(FY2021)
Export Value (USD Million)	188.78	(FY2021-22)
Export Value (USD Million)	205.48	(FY2023-24)
Number of Export Countries	150+	

This table provides a clear, quantitative snapshot of the industry's impressive growth trajectory and current scale. It visually reinforces the narrative of transformation from import dependency to self-sufficiency and growing export prowess, making the economic significance immediately apparent. It also highlights the ambitious projections for future growth, setting the stage for discussions on boosting factors and challenges.

2. THE LANDSCAPE OF PHARMACEUTICAL MARKETING IN BANGLADESH

In Bangladesh, pharmaceutical companies operate within a distinct marketing environment shaped by regulatory constraints. Direct promotion of pharmaceutical products through mass media channels such as television, radio, and newspapers is largely prohibited by regulatory policies. Consequently, the primary and most influential means of promotion is personal selling, predominantly carried out by medical representatives (MRs) [12]. These MRs are tasked with directly engaging medical practitioners to promote their company's drugs, a method consistently identified as highly effective in influencing prescribing behaviors [13]. To support these personal selling efforts, a range of sales promotion tools are employed. Common activities include the provision of free samples, particularly for newly launched medicines or pharmaceutical products, aimed at familiarizing medical and allied professionals with the products and enabling them to gain practical experience [14]. Gifts and inducements are also prevalent, ranging from modest items like pads and pens to more substantial "special doctor's gifts" and donations to medical institutes. Companies frequently organize contests and hospitality events for medical professionals, though these should ideally be secondary to the main purpose of the meeting and proportionate to the occasion. Furthermore, discounts and allowances are extended to drug stores, wholesalers, and retailers, and point-of-purchase displays are strategically utilized in pharmacies [15]. Pharmaceutical companies also incentivize their MRs through commissions and other benefits to motivate higher sales performance. A unique characteristic of pharmaceutical marketing in Bangladesh is the central role of physicians as the primary target audience and decision-makers for drug sales, rather than the patients who are the ultimate consumers. Companies actively identify and target "key opinion leaders" – reputed doctors – with the objective of influencing their prescribing habits [16]. Studies corroborate that promotional tools significantly affect doctors' prescription choices, with the "frequency of visit to the physicians by sales personnel" being rated as a top influencing strategy [17]. The regulatory prohibition on direct-to-consumer advertising has inadvertently fostered a system where pharmaceutical companies are heavily dependent on influencing physicians' prescribing habits through direct engagement and various incentives. This "push" marketing strategy, while demonstrably

effective in securing market share, inherently carries substantial ethical risks due to the inherent power imbalance between pharmaceutical companies and healthcare professionals, and the potential for compromised medical decision-making [18]. The cause of this physician-centric marketing model is the specific regulatory environment that restricts direct-to-consumer advertising. This regulatory framework compels companies to direct nearly all their promotional efforts and financial resources towards influencing prescribers. The consequence is a heightened reliance on incentives and personal relationships, which, as various reports indicate, can lead to practices that "cross limits". This creates a systemic vulnerability to ethical compromises, as the primary objective can shift from solely promoting product merit to securing prescriptions through influence, potentially impacting patient welfare and eroding public trust in the healthcare system [19].

3. EMERGING DIGITAL MARKETING STRATEGIES

In an increasingly interconnected world, digital marketing is rapidly gaining traction as a critical strategy for pharmaceutical companies in Bangladesh. The rising online engagement among patients, healthcare providers, and researchers, who increasingly rely on digital platforms for medical information and product discovery, underscores this shift [20]. Digital marketing offers the distinct advantage of enabling highly targeted communication, allowing businesses to deliver tailored messages to specific audiences such as doctors, pharmacists, or patients. This precision optimizes engagement and ensures marketing budgets are utilized with greater efficiency [21]. The benefits of digital marketing extend beyond targeted communication. It provides both global and local reach, allowing companies to connect with a wider audience while maintaining cost-efficiency, often yielding a higher return on investment (ROI) compared to traditional methods due to its measurable nature and constant optimization capabilities [22]. Furthermore, digital platforms can be designed to ensure regulatory adherence, a crucial aspect in the highly regulated pharmaceutical sector. Digital marketing agencies offer a comprehensive suite of services tailored to the pharmaceutical industry's unique needs. These include Search Engine Optimization (SEO) to improve online visibility and organic traffic for relevant keywords, content marketing to establish authority and build trust through informative and engaging materials (e.g., blogs, whitepapers), and social media marketing (SMM) for engaging with healthcare professionals and raising public awareness [23]. Paid advertising campaigns (PPC) on platforms like Google Ads offer instant visibility for product launches or specific initiatives, while email marketing remains a potent tool for nurturing relationships and disseminating information to healthcare professionals. Video marketing, through tutorials, testimonials, and explainer animations, helps create emotional connections and explain product benefits. Finally, robust web development and optimization ensure a fast, mobile-friendly, and visually appealing online presence [24]. Despite the clear advantages, implementing digital marketing in the pharmaceutical sector in Bangladesh faces specific challenges. Adhering to strict regulatory restrictions, managing audience sensitivity, and ensuring data privacy are paramount concerns that require expert guidance and careful execution. The effectiveness of digital marketing campaigns is further enhanced by developing a user-centric approach, leveraging data and insights to understand user behavior and personalize campaigns, and focusing on mobile optimization, given that a significant portion of users in Bangladesh access the internet via smartphones [25].

4. ETHICAL CONSIDERATIONS AND REGULATORY FRAMEWORK

The pharmaceutical marketing landscape in Bangladesh is significantly impacted by pervasive ethical concerns, particularly regarding the practice of gift-giving to healthcare professionals (HCPs). A 2022 survey by Transparency International Bangladesh (TIB) revealed that a staggering 77% of physicians acknowledge receiving gifts from pharmaceutical companies. This widespread practice raises serious questions about undue influence on medical decision-making and the potential erosion of trust in the

healthcare system [26]. The provision of gifts and incentives to HCPs, often facilitated by medical representatives (MRs), creates a subtle sense of obligation that can lead to a subconscious bias in favor of certain pharmaceutical products, even when alternative medications might be more appropriate for patients. This practice undermines the objectivity of medical decisions, which should be based solely on evidence and patient needs, not financial gain [27]. Such conflicts of interest can result in over-prescription, unnecessary treatments, and the promotion of expensive branded drugs over equally effective and more affordable generics. The erosion of public trust is a significant consequence, as patients may perceive their healthcare providers as being influenced by commercial interests rather than their well-being. The industry's aggressive competition for market share often drives these practices, exploiting a loophole in an under-regulated healthcare market where financial incentives become a standard way of doing business [28]. Bangladesh's regulatory framework for pharmaceuticals has evolved, with the Drugs and Cosmetics Act 2023 repealing older legislation like the Drug Act (1940) and Drug Rules (1946). This new Act aims to modernize oversight, introduce stricter penalties, and provide clearer guidelines for marketing. Specifically, the Act prohibits the sale, storage, or display for sale of "physician samples" and mandates prior approval from the Licensing Authority for any advertisement containing claims related to drug use, health, or treatment. For cosmetics, false or untrue claims in advertisements are prohibited [29]. The Directorate General of Drug Administration (DGDA), established in 1974, serves as the principal regulatory body. Its mandate includes regulating manufacture, import, distribution, and sale, ensuring quality control, and approving drug names. The DGDA also evaluates medicines for safety and efficacy, with the power to suspend or cancel registrations. Companies like Square Pharmaceuticals and Ambee Pharmaceuticals have their own codes of conduct emphasizing ethical behavior, integrity, and fair dealing with stakeholders, including customers and suppliers [30]. Despite these legislative reforms, the enforcement of regulations, particularly concerning gift-giving practices, remains weak. The DGDA faces significant challenges, including limited resources, insufficient staffing, inadequate funding, and a lack of technological infrastructure, which hinder its ability to effectively monitor the vast number of pharmaceutical companies. The law also lacks clear guidelines for more sophisticated forms of influence, such as sponsorships for educational conferences or research grants, which companies may exploit as grey areas [31]. Enforcement is particularly lax in rural and remote areas. The persistence of gift-giving, as evidenced by the 2022 TIB survey conducted after the Act's introduction, highlights the ongoing challenges in enforcement and the need for stronger regulations, greater transparency, and a fundamental cultural shift within the medical profession to prioritize patient care over commercial interests.

5. KEY FACTORS BOOSTING THE PHARMACEUTICAL INDUSTRY

The robust growth of Bangladesh's pharmaceutical industry is deeply rooted in a series of strategic policy interventions and a supportive regulatory framework. A pivotal moment was the promulgation of the Drug Control Ordinance 1982 and the National Drug Policy (NDP) of the same year [32]. These policies were designed to protect the domestic industry from import penetration and foster self-sufficiency. This protective stance allowed local manufacturers to gain significant market share, transforming the country from import-dependent to a major domestic producer and exporter. A significant advantage has been the flexibility granted under the World Trade Organization's (WTO) Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement. As a Least Developed Country (LDC), Bangladesh has benefited from a waiver that allows it to produce generic versions of patented drugs without the need for costly licensing, a benefit extended until 2033 [33]. This policy has provided a substantial competitive edge in global markets, enabling Bangladeshi firms to expand their technological capabilities through technology imitation and reverse engineering. This unique position has allowed Bangladesh to offer generic medicines at lower and competitive prices, particularly to other

LDCs and non-WTO member countries where patent protection is not enforced or compulsory licenses permit production. Government incentives have further bolstered the sector. To promote local Active Pharmaceutical Ingredient (API) production and reduce import dependency, the government offers a 100% tax waiver to producers of five API molecules and a 75% tax waiver for three others, extended until 2032 for domestic producers [34]. The pharmaceutical industry has also been recognized as a "product of the year" in 2018, signaling strong government support. These policy measures, combined with efforts to streamline regulatory approval processes, simplify land acquisition, and provide tax incentives for research activities, send a strong signal to investors and innovators, fostering an environment conducive to growth [35]. The government's broader recognition of the pharmaceutical sector's potential for driving economic growth, generating employment, and improving public health underpins its monumental growth.

6. STRATEGIC INVESTMENT IN ACTIVE PHARMACEUTICAL INGREDIENTS (APIS)

A critical component of Bangladesh's strategy to enhance self-reliance and global competitiveness in pharmaceuticals is the investment in Active Pharmaceutical Ingredient (API) production. Historically, Bangladesh has been heavily reliant on imported raw materials, particularly APIs, with over 90-95% of its API requirements sourced from countries like China, India, and Korea. This dependency exposes the industry to supply chain vulnerabilities and external price fluctuations [36]. To mitigate this reliance, the establishment of the API Industrial Park in Munshiganj is a cornerstone initiative. This park, spread over 200 acres, aims to reduce import dependency, lower production costs, and promote research and development for new APIs. The park was allocated 42 plots for API manufacturing units, with projections of creating approximately 25,000 jobs [37]. While the project has faced delays and cost escalations, with initial completion targets missed, it remains a vital strategic endeavor. Challenges include the small land area compared to international standards for API production and regulatory fragmentation hindering the approval process. Despite these hurdles, the government's commitment is evident through tax incentives for API producers, aiming to attract significant investment and reduce import reliance to 80% by 2032. Accelerating the development of this park is crucial for making the industry more resilient and cost-effective in the long run [38].

7. HUMAN CAPITAL AND TECHNOLOGICAL ADVANCEMENT

The pharmaceutical industry in Bangladesh benefits significantly from a large, skilled, and relatively low-cost labor force, which enhances its attractiveness for manufacturing [39]. This human capital, combined with a strategic geographical location and access to raw materials, contributes to the sector's global competitiveness. The industry is recognized as the largest white-collar employment sector in the country, directly employing over 200,000 people. Beyond a cost-effective workforce, the industry is increasingly embracing technological advancements. There is a growing adoption of Industry 4.0 technologies in manufacturing and validation processes, with approximately 55% of pharmaceutical companies integrating these advanced technologies [40]. This includes automation in warehouse operations and supply chain management tools, implemented by 50% of companies. Leading pharmaceutical companies are steadily increasing their investment in Pharma 4.0 adoption, recognizing its potential to revolutionize production processes, make complex drug manufacturing easier, and enhance flexibility, cost-efficiency, quality standards, and safety. Advanced manufacturing technologies, such as continuous production systems, robotics, containment strategies, and process analytical tools, are increasingly being utilized to ensure safety, quality, and effectiveness in potent drug manufacturing [41]. Furthermore, the industry is witnessing a significant shift towards biomedicines, including biologics and biosimilars. This transition is driven by young talent and innovation, attracting a diverse pool of graduates from fields like biotechnology, genetic engineering, biochemistry, and chemical engineering. Leading companies such as Square Pharmaceuticals, Incepta Pharmaceuticals,

and Beacon Pharmaceuticals are heavily investing in biologics, signaling substantial growth in this area. Bangladesh's capacity to produce high-tech products like insulin, hormones, and anti-cancer drugs, with some companies meeting stringent regulatory standards like US FDA and UK MHRA, underscores its advanced manufacturing capabilities [42]. This commitment to upgrading technological capabilities and investing in advanced manufacturing practices, including biosimilars and complex generics, is a key contributor to the industry's success and its growing recognition on the global stage.

8. DOMESTIC DEMAND AND EXPORT OPPORTUNITIES

The robust and continuously growing domestic demand for pharmaceuticals serves as a fundamental boosting factor for Bangladesh's industry. With a population exceeding 170 million, the need for accessible and cost-effective healthcare products is consistently expanding. The local pharmaceutical sector has effectively risen to meet this demand, ensuring a steady and affordable supply of a diverse range of generic medications [43]. This self-sufficiency has significantly lowered healthcare costs for the Bangladeshi populace and strengthened the national supply chain. The domestic market alone is projected to exceed \$6 billion by 2025, driven by increasing purchasing power and a growing middle-income class. The increasing prevalence of non-communicable diseases also fuels the demand for various therapeutic areas, including anti-diabetics, oncology, cardiovascular, and respiratory treatments [44]. This strong domestic base provides a stable foundation and a significant market for pharmaceutical companies, enabling them to scale production and achieve economies of scale before venturing more aggressively into international markets. The ability to cater to 98% of local demand demonstrates a mature manufacturing base and robust supply capacity. Beyond domestic success, the industry has made significant inroads into export markets. Bangladeshi pharmaceutical products are now exported to over 150 countries, including highly regulated markets like the USA and Europe. Export values reached \$205.48 million in FY2023-24, demonstrating a consistent upward trend [45]. The global demand for affordable generic medicines, particularly as many blockbuster drugs face patent expiry, presents a substantial opportunity for Bangladesh, given its expertise in producing cost-effective generics. The industry is well-positioned to meet rising demand in LDC markets due to its manufacturing expertise and the TRIPS waiver. While challenges exist in penetrating highly regulated markets, the numerous unregulated and semi-regulated markets in regions like Africa, Latin America, and parts of Asia offer immediate opportunities with fewer entry barriers and strong demand for quality, affordable medicines. This dual focus on a strong domestic market and expanding international presence, particularly in the generic segment, positions Bangladesh for continued growth and increased foreign currency earnings [46].

9. CHALLENGES AND STRATEGIC IMPERATIVES FOR SUSTAINED GROWTH

As Bangladesh approaches its graduation from Least Developed Country (LDC) status in November 2026, its pharmaceutical industry faces a pivotal transition with significant challenges, particularly concerning intellectual property rights and trade privileges. The most pressing issue is the impending expiration of the WTO TRIPS waiver, which has allowed Bangladesh to produce generic versions of patented drugs without costly licensing [47]. While some sources suggest the waiver extends until 2033, the core implication remains: after graduation, Bangladeshi firms will be subject to more robust intellectual property regulations, necessitating royalty payments or direct investment in R&D for patented drugs, which will significantly increase production costs. This shift could allow global pharmaceutical giants to reclaim market share that Bangladeshi firms have successfully captured [48]. Beyond the TRIPS waiver, LDC graduation implies the loss of various trade privileges, including duty-free access to several export markets. This could erode the cost competitiveness that has been a key advantage for Bangladeshi pharmaceutical products abroad. The country's export basket is currently heavily concentrated in the ready-made garment (RMG) sector, making the economy vulnerable to

shocks if other sectors, like pharmaceuticals, do not adequately diversify and enhance their competitiveness. To mitigate these impacts, Bangladesh needs to pursue strategies such as signing Preferential Trade Agreements (PTAs) and Free Trade Agreements (FTAs) with key trading partners [49].

10. OVERCOMING API DEPENDENCY AND INFRASTRUCTURE BOTTLENECKS

A persistent and critical challenge for the Bangladeshi pharmaceutical industry is its overwhelming dependency on imported raw materials, specifically Active Pharmaceutical Ingredients (APIs). More than 90-95% of these essential ingredients are sourced from foreign countries, primarily China and India. This heavy reliance makes the entire production chain vulnerable to global supply disruptions, external price fluctuations, and geopolitical events, as demonstrated during the COVID-19 pandemic. Competing with major API producers like India and China, from whom Bangladesh imports, also makes it difficult to achieve price competitiveness in the global generic market [50]. The government's flagship initiative to address this, the API Industrial Park in Munshiganj, has faced repeated delays and has not developed as initially planned. Despite being allocated 200 acres of land 18 years ago and having 42 plots for API manufacturing units, only 15 companies have commenced production. Challenges include the perceived small size of the park by international experts, the high cost of specialized machinery, lack of adequate production space, and a fragmented regulatory approval process. The absence of a unified government approach to resolving regulatory issues creates inefficiencies and delays the establishment of API manufacturing units, restricting growth in this vital sector [51]. Beyond API production, broader infrastructure bottlenecks, including insufficient power supply, poor transport networks, and inefficient logistics, further hinder the industry's operations and supply chain efficiency. These issues contribute to higher production costs and delays in meeting both domestic and international demands. Accelerating the establishment of the API Industrial Park and supporting local production capabilities are essential steps to reduce import dependency, enhance resilience, and improve cost-effectiveness [52].

11. ADDRESSING TALENT GAPS AND FOSTERING INNOVATION

A significant challenge for the Bangladeshi pharmaceutical industry lies in the gap between its technical demands and the available talent pool. There is a disheartening shortage of skilled professionals, particularly high-quality researchers, chemists, and pharmacologists, necessary for modern pharmaceutical manufacturing, especially in advanced fields like biologics and hormone-based treatments. This lack of specialized skills limits the industry's growth potential and its ability to master complex technologies such as modern biotechnology and gene therapy [53]. Furthermore, the industry's investment in research and development (R&D) is relatively low, averaging only 3.4% of total annual expenditure in 2024. This limited R&D capacity hinders the development of new chemical entities (NCEs), new drug delivery systems (NDDS), and the ability to innovate independently. While some progress has been made in developing a COVID-19 vaccine candidate and patenting new chemical entities abroad, there is a recognized lack of sufficient innovative activities within the country. After LDC graduation, firms anticipate that buying patent rights to produce patented drugs will be cheaper than investing heavily in R&D, potentially slowing down the technological learning process that has fueled past development [54]. To address these challenges, strategic initiatives are crucial. Bridging the gap between educational institutions and the pharmaceutical industry through integrated academic programs in pharmaceutical technology and biomedical engineering can foster the creation of skilled manpower. The government should establish dedicated research funds to support scientific breakthroughs and encourage collaboration between local firms and R&D institutes through research grants. Promoting technology transfer and developing a public sector R&D roadmap with clear priorities are also essential for post-TRIPS sustainability.

12. STRENGTHENING ETHICAL MARKETING AND REGULATORY ENFORCEMENT

The pervasive practice of pharmaceutical companies providing gifts and incentives to healthcare professionals (HCPs) remains a significant ethical concern that impacts the industry's reputation and competitiveness. A 2022 survey by Transparency International Bangladesh (TIB) indicated that 77% of physicians acknowledge receiving gifts from pharmaceutical companies, despite legal prohibitions. This practice fosters conflicts of interest, potentially leading to prescribing decisions that prioritize commercial gain over patient welfare, thereby eroding public trust in the medical profession. The aggressive competition among companies for market share often drives these manipulative marketing tactics, which include lavish gifts, money, and sponsorships for educational events, blurring the lines between professional ethics and personal gain [43]. Despite the introduction of the Drugs and Cosmetics Act 2023, which aims to regulate these practices, enforcement remains weak. The Directorate General of Drug Administration (DGDA), the primary regulatory body, is underfunded and lacks the necessary manpower and resources to effectively oversee these interactions, particularly in rural areas. The law also has ambiguities and loopholes regarding more sophisticated forms of gift-giving, allowing unethical practices to persist unchecked. This lack of transparency, unlike in countries with mandatory disclosure laws, makes it difficult to hold both doctors and pharmaceutical companies accountable [55]. To ensure sustainable growth and protect the integrity of the medical profession, it is essential for Bangladesh to strengthen its regulatory framework and enforce stricter guidelines. This requires providing the DGDA with adequate funding, staffing, and technological infrastructure, developing clear and standardized enforcement procedures, and implementing penalties severe enough to act as a deterrent. A cultural shift within the medical profession, prioritizing ethical standards and transparency alongside commercial objectives, is also critical to rebuild and maintain public trust.

13. CONCLUSION AND RECOMMENDATIONS

Bangladesh's pharmaceutical industry stands as a remarkable success story, having transformed from import dependency to a self-sufficient sector that is increasingly making its mark on the global stage. Its robust growth, significant contribution to the national economy, and ability to meet nearly all domestic demand for medicines underscore its strategic importance. This success has been largely shaped by proactive government policies, particularly the Drug Control Ordinance of 1982 and the National Drug Policy, which fostered local manufacturing and leveraged the TRIPS waiver to promote generic drug production. The industry's reliance on a cost-effective workforce and its burgeoning domestic market have further propelled its expansion. However, the sector faces a critical juncture, particularly with the impending expiration of the TRIPS waiver and the persistent reliance on imported Active Pharmaceutical Ingredients (APIs). These challenges, coupled with infrastructure bottlenecks, a shortage of skilled R&D professionals, and ongoing ethical concerns in marketing, necessitate a forward-looking and comprehensive strategic approach. To sustain its impressive growth trajectory and solidify its position as a global pharmaceutical powerhouse, the following recommendations are crucial:

- **Accelerate Local API Production:** Prioritize and expedite the full operationalization of the API Industrial Park. This requires addressing land allocation issues, streamlining regulatory approval processes, and providing enhanced financial incentives for companies to invest in local API manufacturing. Reducing import dependency on APIs is fundamental to enhancing resilience, lowering production costs, and improving global competitiveness.
- **Strategic Export Market Diversification:** While continuing to serve unregulated and semi-regulated markets, intensify efforts to penetrate highly regulated markets (e.g., USA, EU). This necessitates significant investment in achieving international certifications (such as US FDA, EU GMP), developing bioequivalence testing facilities, and adhering to stringent quality control

measures. Simultaneously, explore and negotiate new trade agreements (FTAs, PTAs) to mitigate the impact of losing LDC trade privileges post-graduation.

- **Invest in Human Capital and Advanced Technologies:** Bridge the talent gap by fostering stronger collaboration between academic institutions and the industry. This includes integrating pharmaceutical technology and biomedical engineering into academic curricula, offering scholarships, internships, and specialized training programs. Encourage greater investment in R&D, potentially through dedicated government funds and tax incentives, to drive innovation in new chemical entities, biosimilars, and complex generics. Promote the adoption of Industry 4.0 technologies, automation, AI, and robotics in manufacturing and supply chain management to enhance efficiency, quality, and competitiveness.
- **Strengthen Ethical Marketing and Regulatory Enforcement:** Bolster the capacity of the Directorate General of Drug Administration (DGDA) by providing adequate funding, staffing, and technological resources. Develop clear, standardized procedures for investigating and penalizing unethical marketing practices, particularly gift-giving to healthcare professionals. Implement stricter regulations with severe penalties for non-compliance and enhance transparency requirements to rebuild and maintain public trust in the healthcare system. Foster a culture of ethical conduct throughout the industry, emphasizing patient welfare as the paramount priority.
- **Foster Robust Public-Private Partnerships:** Encourage greater collaboration between government bodies, regulatory authorities, industry leaders, and academic institutions. This synergy is vital for formulating forward-looking policies, streamlining administrative frameworks, attracting foreign direct investment, and collectively addressing the structural weaknesses of the industry.

By strategically addressing these imperatives, Bangladesh can navigate the complexities of a more competitive global trade environment, transform existing challenges into new opportunities, and ensure its pharmaceutical sector continues to be a beacon of national pride and a significant contributor to global health.

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