RESEARCH PAPER

From Submission To Approval: Unpacking Regulatory Dossier Rejections And Delays In Asean: A Review

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ABSTRACT
Three countries in Association of Southeast Asian Nations (ASEAN) region i.e. Thailand, Malaysia, and Singapore have made many significant attempts towards harmonization of regulatory practices. One example of this harmonization is adoption of ASEAN Common Technical Dossier (ACTD) and ASEAN Common Technical Requirements (ACTR). Even after these efforts longer review durations for generic application and frequent rejections are still there. These delays or rejections in generic dossier not only impact market access for companies but also prevent timely access to essential medicines for patients, which has a direct impact on public health.
This article undertakes systematically analysis of the regulatory frameworks across three countries, to identify common reasons for dossier rejections, such as incomplete submissions, non-adherence to global or nationalized regulatory requirements, and quality-related deficiencies. Additionally, this review examines factors which contribute to delays in approval and country-specific regulatory hurdles. The findings indicates that Singapore is a leader in digital advancement and offers streamlined regulatory pathways; however, its stringent requirements can sometime act as barriers in approval. Conversely, other two countries i.e. Thailand and Malaysia continue to face its regulatory procedural bottlenecks.
The findings indicated toward the urgent need for harmonization of standards, scope for digitalization of information, use of electronic submission platforms to save time and use of artificial intelligence (AI), adopting regulatory practices and requirement as laid down by internation regulatory bodies like International Council for Harmonisation of Technical Requirements of Pharmaceuticals for Human Use (ICH) and World Health Organization (WHO), strengthening joint assessment initiatives and enhancing cross-country collaboration between authorities. Utilizing mutual recognition and joint assessments of dossiers and providing regular training, on current expectation, to industry would also help in ensuring timely, accurate submissions and in turn faster approvals. By addressing these points, these three countries can improve their regulatory efficiency, reduce delays in approval, and provide faster access to high-quality medicines for their people.
Keywords: ASEAN, ACTD, dossiers, Thailand, Malaysia, Singapore, rejection, delays, regulatory harmonization, ICH, health impact.
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INTRODUCTION

Generic medicines are the medicines having same dosage form, strength, route, quality, and performance attributes as their brand-name version [1]. Being cost-effective, they contribute significantly to making healthcare affordable, especially in developing regions [2, 3, 4, 5]. ASEAN is a group consisting of ten nations in Southeast Asia, including Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam. The generic pharmaceutical market within ASEAN has experienced notable growth, remarkably in Thailand, Malaysia, and Singapore [6].

Thailand, Singapore and Malaysia are three ASEAN countries connected through three dimensions i.e market growth, regulatory harmonization, and regional trade integration. Thailand's pharmaceutical market was valued approximately 5.9 billion US dollar (USD) in 2019. It had grown to USD 6.4 billion in 2020, representing an 8.7% year-on-year increase, and projections indicated it would reach USD 6.9 billion by 2024, with a five-year compound annual growth rate (CAGR) of 3.1% [7]. Singapore's generic drug market is forecasted to attain a valuation of USD 0.4 billion by 2029, with steady growth anticipated. Similarly, in Malaysia, the generic and biosimilar segment was estimated at USD 898.7 million in 2022 and is expected to expand to USD 1,237.4 million by 2030, reflecting a CAGR of 4.08% during 2023–2030 [8]. The combined market size of these three countries is around USD 17.2–18 billion in 2025, emphasizing the importance of harmonized regulatory frameworks to sustain this growth momentum.

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The pharmaceutical industry serves a critical function in protecting public health by ensuring the availability of safe, effective, and high-quality medicines [9]. All medicines must undergo regulatory approval procedure, before they could be placed in the market. During this approval procedure Agency ensures that proposed drug meet established quality standards to safeguard patient safety [10]. The first step in generic drug registration is submission of application dossier to the relevant health authority. Upon receipt of any application Agency carries out screening of the dossier. Screening period is also known as validation phase [11]. During screening submitted application is reviewed for completeness and compliance with submission guidelines. Once screening phase is complete, Agency accepts the dossier for substantiative review and if all requirements are met approval is granted. Receiving approval is not the final step; any alterations to the initially approved application, such as change in composition, manufacturing, or change in specification etc. requires regulatory approval to ensure continued compliance and safety. These variations also undergo the screening phase before it is accepted for a detailed review. Overall registration process of a generic drug in Thailand, Singapore and Malaysia is presented in figure 1, 2 & 3.

In ASEAN countries, this process varies in strictness and duration from one country to another. A significant number of applications gets stuck in screening phase due to common errors and/or failure to meet specific regulatory guideline(s). To streamline the submission and evaluation of regulatory dossiers across ASEAN members, ASEAN Consultative Committee for Standards and Quality (ACCSQ) and ACCSQ's Pharmaceutical Product Working Group (PPWG) has introduced ACTD and APRF as a significant milestone [12, 13]. Despite these harmonization efforts, regulatory approval in ASEAN region remains non-uniform [14, 15]. Identifying these common causes of invalidation is important for any organizations, so that they could streamline their drug application submission, have faster approval, avoid any potential delays. This would also help in ensuring undisturbed product availability.

This review undertakes a systematic, structured review of publicly available literature for three selected countries, with the objective to explore key aspects of regulatory frameworks, approval process, bottlenecks in timely approval of application, common cause contributing to delays or dossier rejections as well as a to understand nationalized regulatory challenges.

Fig. 1: Generic drug registration process in Thailand

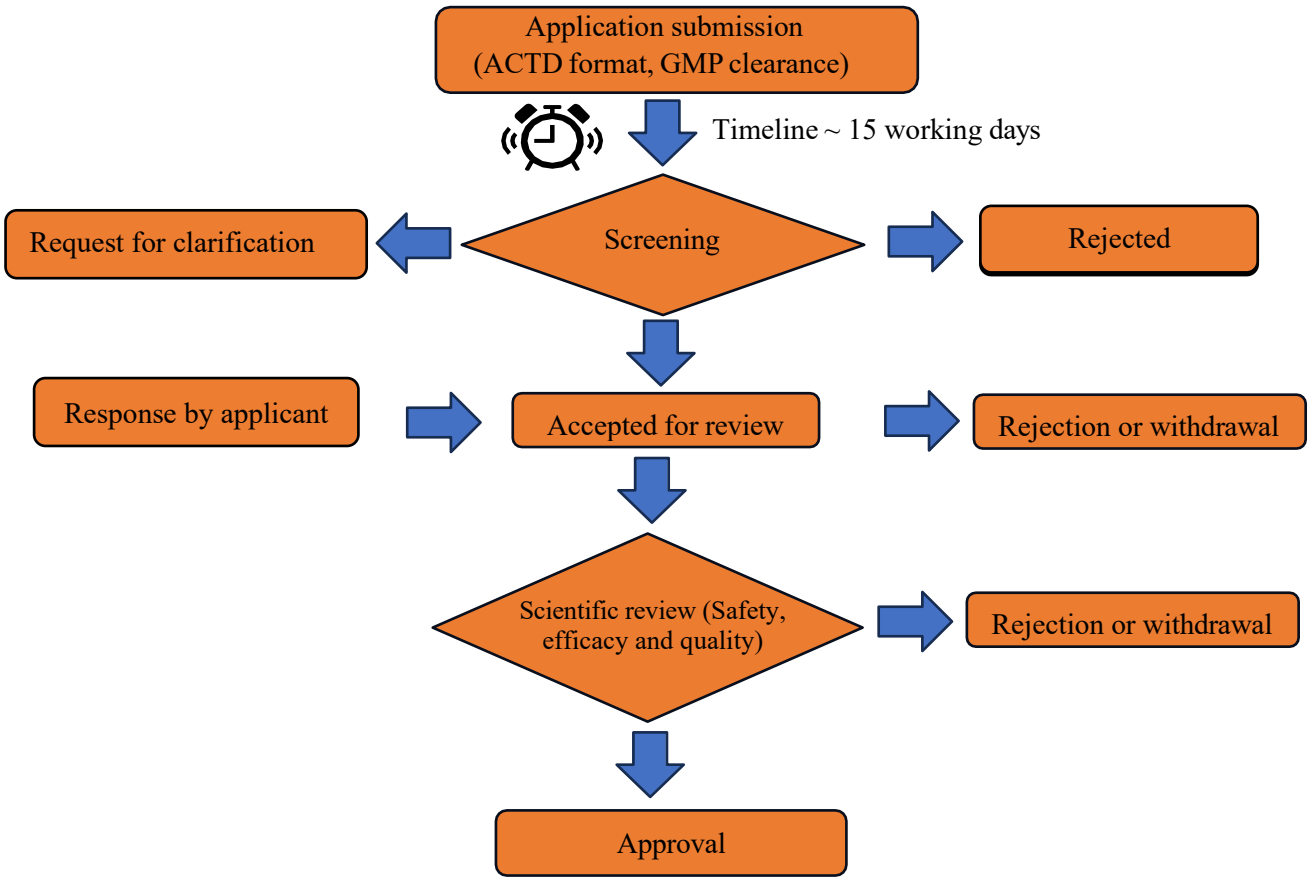


Fig. 2: Generic drug registration process in Singapore

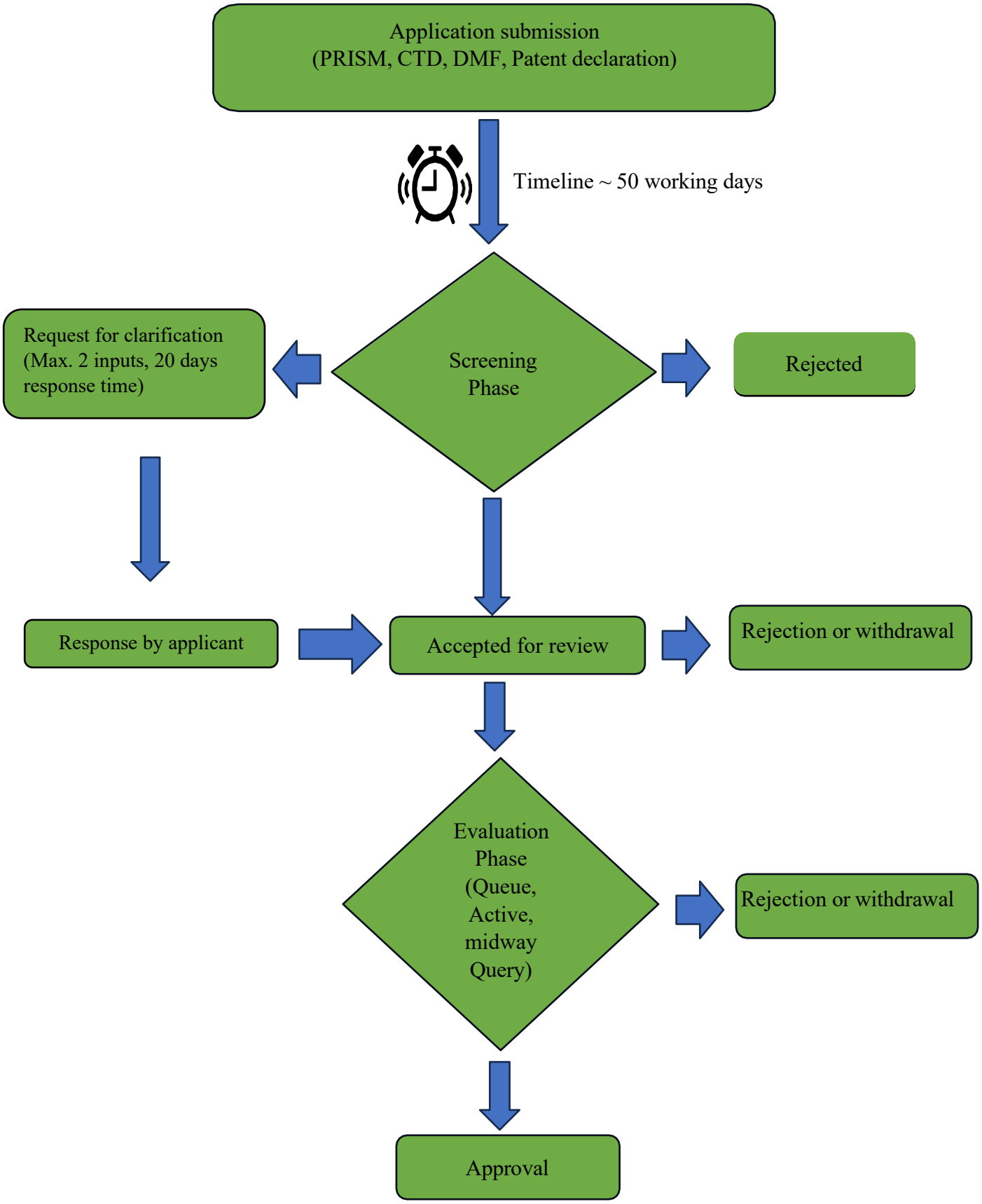
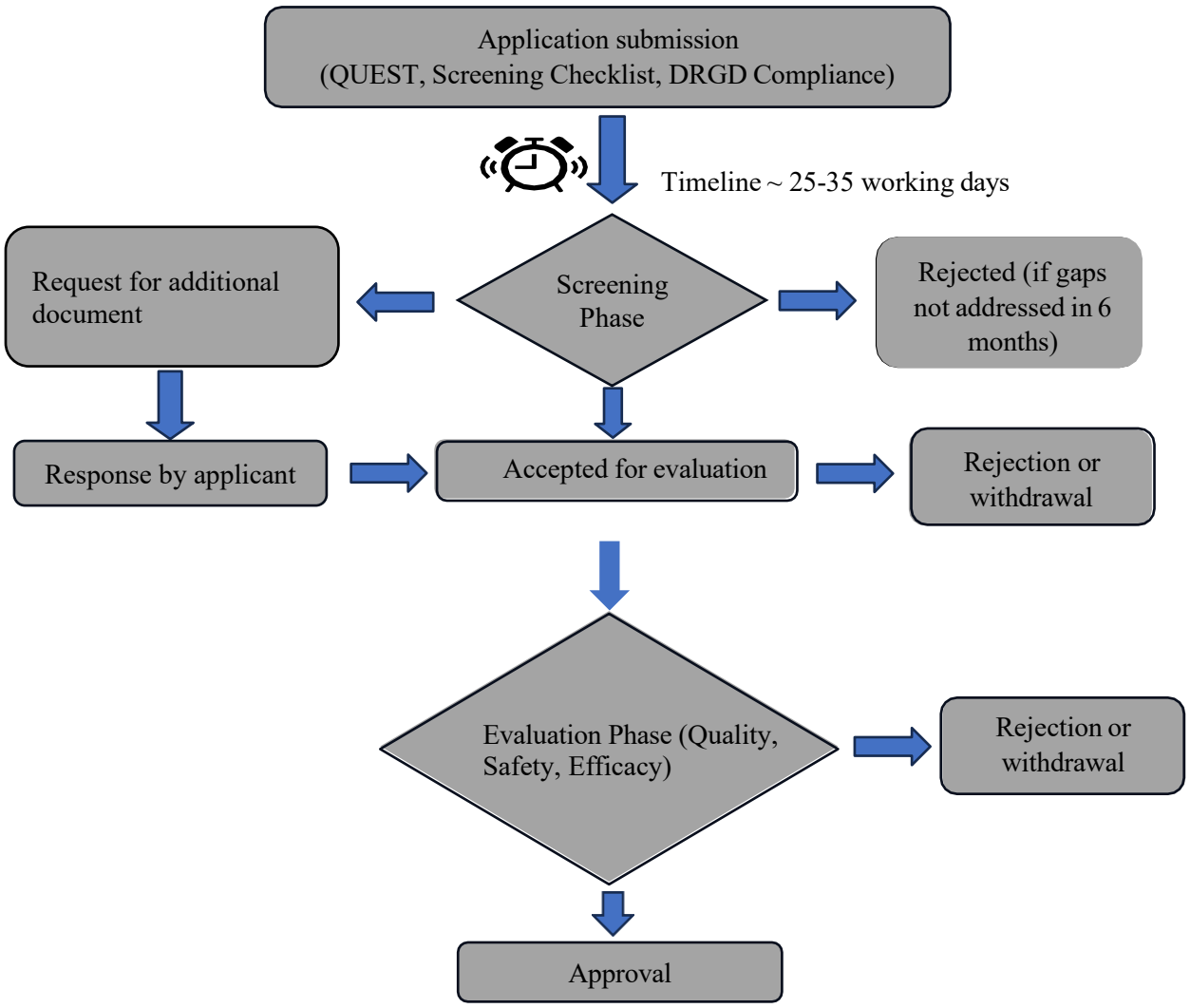


Fig. 3: Generic drug registration process in Malaysia



METHODOLOGY

A systematic search, qualitative analysis of publicly available regulatory literature and case studies related to topic for Thailand, Malaysia, and Singapore generic drugs regulatory frameworks over years. We carefully went through the retrieved content and systematically analysed the information. The detailed collected literature helped to notice recurring patterns of assessing generic applications by regulatory bodies of selected countries. We also identified key areas that explain common bottlenecks in timely approvals, as well as frequent reasons for delays or rejection of dossiers.

Data collection and extraction

For this review, information and data is collected from multiple online sources such as PubMed, Scopus, Google Scholar, ResearchGate. Articles were searched using the common terms like generic drug registration, rejection, approval delay, expedite approval, drug approval, bottleneck in approval, ASEAN, ACTD, eCTD, registration. We also referred to other relevant data sources such as ASEAN reports, documents, ASEAN ACTD guidelines [12, 13], the ICH M4 Common Technical Document format [16], official national regulatory websites [TFDA, HSA and NPRA], and reports analysing the impact of these regulations on the pharmaceutical industry. The search is performed during July 01 to Nov. 07, 2025.

Eligibility criteria

Collected peer-reviewed journal articles and Agency's official publications reports that offer meaningful insights into the approval process for generic drug dossiers were reviewed to collect insights into key aspects of generic dossier approval, common reasons for delays or rejections, any statistical data related to rejection and/or delay, initiative taken by the Agency towards industrial training to support industry stakeholders. Attention is given to literature that discusses the regulatory frameworks in Thailand, Malaysia, and Singapore. To ensure uniformity and clarity in interpretation, only English-language publications were included in the review.

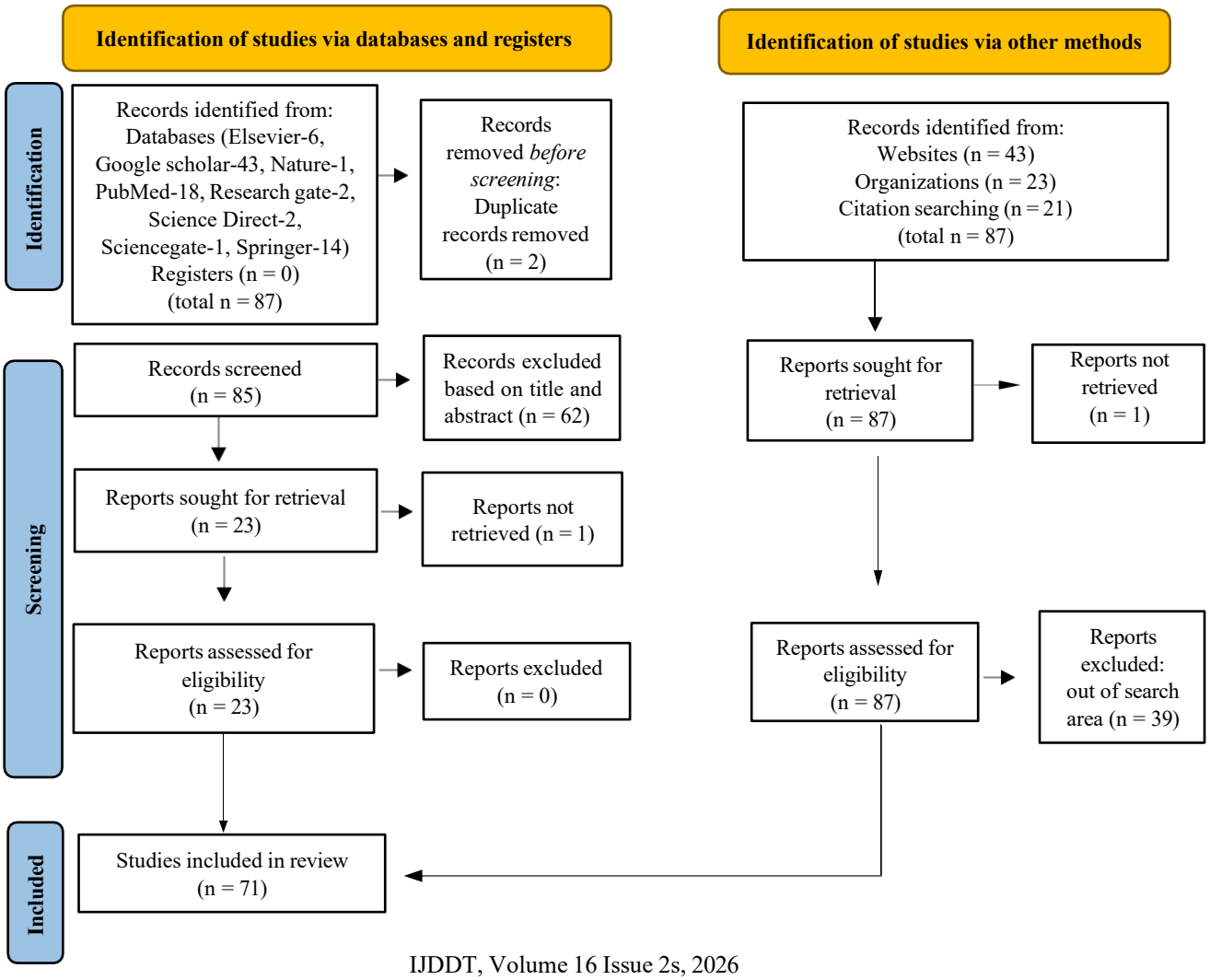
Exclusion Criteria

Articles were excluded if they lacked peer review, did not focus on generic drug approvals, or don't have any relevant data on regulatory timelines, rejection criterions, or Agency-driven initiatives. Publications focusing primarily on non-ASEAN countries or those limited to aspect other than regulatory are not considered for inclusion in this review. These criteria were applied to maintain the scientific diligence of the review, ensure relevance to the objectives.

Literature selection

In initial search across major databases such as PubMed, Google Scholar, ResearchGate, and other search engines, 87 potentially relevant articles and reports were identified. An additional 87 records were identified through manual searches of regulatory agency websites, organizational reports, and cross-references. After removing duplicates, 172 unique articles remained. These were screened based on titles and abstracts, resulting in the exclusion of 62 articles that did not align with the scope of this review. The remaining articles were then assessed in detail to determine relevance and methodological. Of these, 39 were excluded due to insufficient focus on the selected markets (Thailand, Malaysia, and Singapore), lack of emphasis on generic drug approval processes, or limited applicability to the study's objectives. Ultimately, 71 articles met the inclusion criteria and were selected. The entire screening process is presented in the PRISMA flow diagram (Fig. 4), which outlines each step of the review methodology.

Fig. 4: PRISMA flow diagram for selected literature



RESULTS

Thai Food and Drug Administration (Thai FDA) typically completes screening within 15 working days [17], while Malaysia's generic drug approval agency [National Pharmaceutical Regulatory Agency (NPRA)] averages 25-35 working days. Singapore's generic drug approval agency [Health Sciences Authority (HSA)] completes initial screening within 50 days working days [18]. In Thailand, Malaysia, and Singapore a generic drug application can be review by either of the three types of review processes, i.e. full review, abridged review, and verification review [19]. The full review involves a complete independent evaluation of all quality, safety, efficacy, and bioequivalence (if applicable), and this route is used when there is no prior approval from any recognized agencies. The abridged review is a streamlined review process for products already approved by at least 1 stringent reference agencies (such as US FDA, Health Canada, European union etc.) and therefore ASEAN countries only review country specific nationalized requirements. The verification review is the fastest route, followed for drug products which are already approved by at least 2 reference agencies, in these cases ASEAN countries primarily verifies the authenticity and completeness of the documents with minimal additional evaluation [20, 21]. Generic dossier screening and approval timelines along with common challenges, for on time approval, are presented in the table-1.

Table 1: Generic dossier review timelines and common challenges

Country (Agency name)	Dossier format (s)	Screening timelines/ Review timelines	Common challenges
Thailand (Thai FDA)	Both ACTD or ICH CTD	**Screening timelines:** 15 working days **Review timelines: Standard route (full evaluation):** 6-9 months **Abbreviated route:** 60-90 working days **Verification route:** 90–120 working days	Legalized Certificate of Pharmaceutical Product (CPP), unpredictable reviewer queries, long approval timelines
Singapore (HSA)	Both ACTD or ICH CTD	**Screening timelines:** 50 working days **Review timelines: Standard route (full evaluation):** 270 working days **Abbreviated route:** 240 working days **Verification route:** 120 working days	Dossier completeness issues, Strict reliance pathways, Zone IVb stability
Malaysia (NPRA)	Only ACTD	**Screening timelines:** 25-35 working days **Review timelines: Standard route (full evaluation):** 210 working days **Abbreviated route:** 116–136 working days **Verification route**: 70 Working days (previously 120 working days)	Web-only submission, strict timelines, Good Manufacturing Practice (GMP) conditions

These three agencies (Thai FDA, NPRA and HSA) have made steps to improve dossier evaluation and accordingly introduced a screening checklist for generics to reduce incomplete submissions. This checklist enlists the requirements which if not fulfilled could lead to rejections or a major cause of delay in approval [22, 23, 24]. Singapore has implemented many digital platforms example Singapore Health Product Access and Regulatory E-System (SHARE). SHARE is designed to streamline regulatory processes, allowing applicants to submit and track dossiers more efficiently [25]. During screening phase or during the review period, if any gap(s) is identified, applicant is given opportunity to fix the same. If these gaps are not fulfilled this leads to delay or may be a rejection of the application. The consequences of regulatory delays and rejections are many-sided. For pharmaceutical companies, they cause increased costs, disrupted launch timelines, and strategic uncertainty. For healthcare systems and patients, they mean delayed access to potentially life-saving therapies [26]. For governments, delays can result in increased public health burdens and higher healthcare expenditures due to non-

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availability of generic alternates. The ASEAN region has been working on harmonizing regulatory expectation, processes, using standardized format for submitting dossiers such as ACTD and APRF frameworks [12, 13], despite these frameworks, implementation varies widely due to differences in national regulations, review turn around, and technical expertise. Thailand, Malaysia and Singapore have their own preference for ICH and ACTD dossier format [27, 28]. All three countries have standard review process as well as Abbreviated and verification review pathways [29, 30, 31].

Country-specific regulatory issues leading to delay and rejections

As mentioned in beginning these three countries are not harmonized completely in their regulatory requirements. Nationalized regulatory requirements or expectation, which usually leads to delay in approval or rejection of the dossier, are presented in this section.

Thailand

Thai FDA is the national regulatory authority overseeing the quality, efficacy and safety of a medicine in Thailand. All pharmaceutical applicants must get registered themselves with the Thai FDA prior to submitting a generic drug application [32, 33, 34]. Submissions could comply with either ICH or ACTD format. Following are the factors leading to delay in approval or rejection [7, 35, 36].

Common Challenges Leading to Delay in Thailand

Thai FDA allows up to five queries without fees; beyond that, each query incurs a fee and adds review time. CPP must be country specific, legalized and mention Thailand as the importing country, otherwise there is a delay [37]. Zone IVb (30 ºC ± 2 ºC, 75% RH ± 5% RH) stability data is mandatory; accordingly missing data leads to rejection or delay. GMP compliance is a prerequisite for all facilities involved in the manufacture, testing, and packaging of generic medicines, and is strictly required by regulatory authorities. GMP certificate must be issued either by TFDA or by any of Pharmaceutical Inspection Co-operation Scheme (PIC/S) countries [38]. Thai FDA conducts both local and foreign site inspections, with increasing reliance on electronic documentation and remote audits post-pandemic. Absence of GMP certificate adds on to the review timeline. BE studies must be conducted in government-approved institutes. Delays occur due to protocol approvals and site GMP limitations.

Common challenges leading to rejection of the dossier

Presented in the table-2.

Table 2: Rejection point along with example for Thailand

Rejection Point	Description	Example
1. Incomplete ACTD Submission	Missing or improperly filled modules in the ASEAN Common Technical Dossier (ACTD)	Module 3 (Quality) lacks specifications for The active pharmaceutical ingredient (API).
2. Bioequivalence Issues	Absence or inadequacy of BE studies for generics.	A generic oral tablet submitted without a BE study comparing it to the reference listed drug [39].
3. GMP Non-compliance	Missing or invalid GMP certificate from the manufacturing site.	Manufacturer submits a GMP certificate that Expired six months ago.
4. Unacceptable Product Composition	Use of banned or restricted substances or unjustified excipients.	A syrup formulation includes saccharin sodium, which is restricted in pediatric products.
5. Labeling and Packaging Violations	Non-compliant labels or packaging materials.	Label includes therapeutic claims not approved by Thai FDA or lacks Thai language translation.
6. Stability Data Deficiencies	Inadequate or missing stability studies under Thai climatic conditions.	Stability data provided only for zone II condition (25°C ± 2°C / 60% RH ± 5% RH), and not for zone IVb i.e 30°C ± 2°C / 65% RH ± 5% [40].
7. Pharmacovigilance Gaps	Missing risk management or post-marketing surveillance plans.	No local contact for adverse event reporting or no pharmacovigilance system described.
8. Authorization and Legal Documents	Missing or invalid legal documents such as Power of Attorney.	Local agent Submits an outdated authorization letter from the foreign manufacturer [41, 42].
9. Non-adherence to Thai FDA regulations	Failure to follow nationalized regulatory requirements.	Applicant uses the abridged evaluation route without meeting eligibility criteria.

Regulatory actions taken by TFDA

Upon observation of any gap(s), TFDA would be taking regulatory action which may include requests for additional data, application rejection and product recalls. The Thai FDA has introduced 2019 law, which mandated the expiring validity periods for marketing authorization (MA). Earlier MA indefinite or longer durations (often 10 years or more depending on product type and classification), but with this 2019 law implemented stricter renewal and post-market surveillance requirements including a 7-year validity for market authorizations and mandatory renewals [43].

Malaysia

In Malaysia generic drug applicants must be registered with Agency before submitting the application [44]. NPRA emphasizes compliance with ACTD format only and key consideration is given to BE data, and documentation completeness [45]. Following are the factors leading to delay in approval or rejection [46].

Common challenges leading to delays in Malaysia

Main reason which may cause the delay includes dossier submission via NPRA portal only and traditional hard copies submission are not accepted [47]. If NPRA issue a screening query(ies), that must be responded with 6 months. Failure to respond to screening queries within stipulated time leads to automatic rejection [48]. Manufacturing site GMP inspections are mandatory and often delayed due to resource constraints. Additional data raised by NPRA during review period often extend the final approval timeline.

Common challenges leading to rejection of the dossier

Presented in the table-3.

Table 3: Rejection point along with example for Malaysia

Rejection Point	Description	Example
1. Incomplete Documentation	Missing required appendices or Missing documents or forms in the Drug Registration Guidance Document (DRGD).	Module 3 lacks API specifications or missing signed declaration forms.
2. Bioequivalence (BE) Data	Absence or inadequacy Of required BE studies For oral generics.	No BE study provided for a generic tablet With systemic action [39].
3. GMP Compliance	GMP certificate not Issued by recognized Authority or expired.	Manufacturer Submits GMP certificate older than 2 years.
4. Product Composition	Use of prohibited or restricted substances without justification.	Product contains phenolphthalein, which is banned in Malaysia [49].
5. Labeling & Packaging Violations	Labels not meeting NPRA's General or specific requirements.	Label includes unapproved claims or lacks Bahasa Malaysia translation. Misleading graphics.
6. Stability Data issues	Stability data must comply with ASEAN guidelines and Malaysian climate.	Missing or inadequate stability data under ASEAN Zone IVb conditions. Example stability data is provided for Zone II condition (25°C ± 2°C / 60% RH ± 5% RH), and not for zone IVb i.e 30°C ± 2°C / 65% RH ± 5% [40].
7. Pharmacovigilance (PV)	Required for certain product types; post-marketing surveillance may be mandated.	No local PV contact or Missing risk management plan. No PV system described.
8. Legal Documents	Authorization letters and manufacturer declarations are mandatory.	Missing or invalid Power of Attorney or manufacturer authorization. Authorization letter not signed or not dated within the last 12 months.
9. Evaluation Route Issues	Incorrect evaluation pathway (full vs. abridged) may lead to rejection.	Applicant uses abridged route without fulfilling Reference agency criteria.
10. Reference Agency Rejection	May influence	Product rejected by EMA due to

	decision if product is rejected elsewhere without explanation.	safety concerns, but no justification provided in NPRA submission.
11. Response Timeliness	NPRA may reject or defer applications if queries are not addressed promptly.	Applicant fails to respond to NPRA's Clarification request within the 30-day deadline.

Regulatory Actions

Regulatory actions taken by NPRA includes request for additional data, rejection of MA application, and product recalls. Regulatory actions taken in last 4 years are presented in table-4 [45].

Table 4: Regulatory actions taken in last years

Year	Cancellati-ons	Recalls	Warnings	Voluntary Recalls	Total Actions
2021	2	2	20	2	26
2022	3	2	57	2	64
2023	0	0	67	0	67
2024	(not detailed)	--	--	--	--

Singapore

Generic drug applications fall under the Generic Drug Application (GDA) pathway, which requires BE with a reference product already approved in Singapore [50]. HSA is considered a regional leader in regulatory efficiency. Singapore uses both ICH CTD and ACTD formats for generic drug applications. Following are the factors leading to delay in approval or rejection [51, 52].

Common challenges leading to delay in Singapore

Applications are rejected at screening if CPP does not list Singapore as the importing country. Similarly, if CPP is missing or outdated CPP is included in dossier, HSA raises the query [53]. BE studies must use the Singapore Reference Product (SRP); BE studies conducted using foreign reference product often fail to meet this country specific requirement. BE studies performed as per foreign regulatory frameworks, without considering the dosing regimen specified in the SRP's package insert and/or any additional requirements, such as multi-dose studies, results either in rejection or substantially delay the approval of dossier. Missing dissolution data and/or missing dissolution studies conducted using BE reference product and SRP or lack of dose proportionality usually leads to denial of biowaiver requests, which in turn raises a need for BE and this lengthen the approval timeline [54]. If Zone IVb stability data on minimum number of batches is not included or in case of multiple finished product manufacturing site, stability data is not submitted from all sites, HSA would reject the dossier. Inadequate legal review of patent status can also block the submission, example there was insufficient support to correctly identify the suitable category for the patent filing.

Common challenges leading to rejection of the dossier

Presented in the table-5.

Table 5: Rejection point along with example for Singapore

Rejection Point	Description	Example
1. Incomplete Documentation	Missing or incorrectly filled sections in the application.	Module 3 lacks specifications for excipients or manufacturing process. Outdated Letter of Authorization, mismatched addresses, or missing GMP details, incorrect forms, missing signatures
2. Incorrect Product Classification	Product does not match the category applied for (e.g., drug vs. health supplement).	An herbal product submitted as a therapeutic drug without clinical data.
3. Inadequate Clinical or BE Data	Insufficient data to support safety, efficacy, or bioequivalence.	Generic tablet submitted without BE study or justification for waiver.
4. Rejection by Reference Agencies	Same product's application is previously rejected by high surveillance regulatory body example Health Canada (HC) without proper explanation.	Applicant fails to explain why HC rejected the product for safety concerns.
5. Labeling and Packaging Non-compliance	Labels or inserts do not meet HSA standards.	Label includes unapproved claims or lacks mandatory warnings.
6. Evaluation Route Misuse	Wrong registration pathway chosen	Applicant uses Verification route without

	(e.g., Verification instead of Full).	prior approval from reference agency.
7. Failure to Respond to Queries	Applicant does not reply to HSA's clarification requests within the deadline.	HSA requests clarification on stability data, but no response is received.
8. GMP or Manufacturing Issues	Manufacturing site not compliant or lacks valid GMP certification.	Manufacturer listed is not on HSA's recognized GMP list.

Regulatory Actions

HSA actively enforces regulatory compliance to ensure safety of its people. It's regulatory actions encompass a range of measures, including requests for supplementary data or clarifications from applicants to address gaps or concerns in the submitted dossiers, rejection of application if the applications fail to meet regulatory requirements and product recalls in case there is some critical finding that stands a serious threat to public health or could lead to death or serious injury. HSA conducts regular post-market surveillance and issues public alerts for non-compliance.

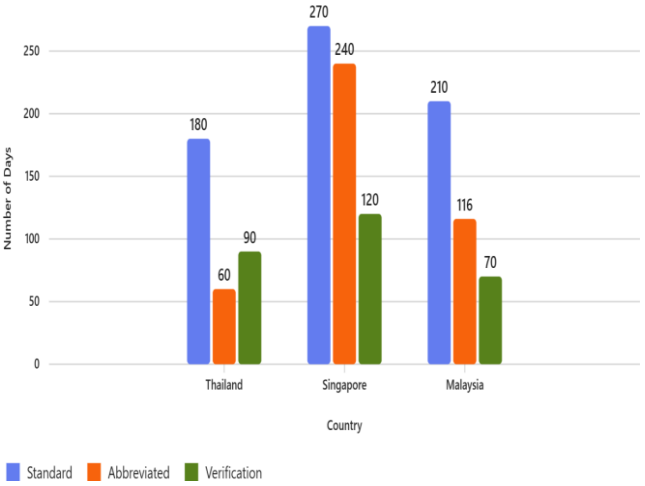
Impact of rejection or delay in approval of application on industry and public health

The financial impact of regulatory delays estimates to $ 500,000 / day in lost sales. Medications for infectious diseases, blood disorders, heart conditions, and gastrointestinal issues face the highest risk of market erosion [55]. Delays can increase the overall regulatory burden on both industry and agencies, hindering innovation and efficiency. Delays can lead to increased costs for pharmaceutical companies due to extended development timelines and potential loss of market opportunities. Delays in approving application can hinder the timely availability of new or updated medications to patients and this could result in higher rates of illness, death, and increased healthcare expenses [7, 56].

DISCUSSION

This research made extensive assessment of generic drug approval process in Thailand, Malaysia and Singapore. This research indicates that even after despite the harmonization efforts made by different internation regulatory bodies, there are significant differences in the regulatory practices and requirements of Thailand, Malaysia and Singapore. There is significant difference in approval timelines as well. Generic application approval timeline, following different assessment routes is presented in fig. 5. One major reason for this non-uniformity is that each country has its own national regulatory authority, with varying levels of infrastructure, expertise, and procedural differences. These differences lead to inconsistencies in dossier evaluations practice, which in turn results in delays and/or rejection that ultimately hinder market access and some non-availability of generic medicines [57]. Within the ASEAN region, Thailand, Malaysia, and Singapore represent three diverse regulatory landscapes, each characterized by its unique strengths and challenges. Singapore stands out for its advanced digital infrastructure and streamlined approval pathways, which enhance efficiency and transparency. Malaysia has made notable progress in harmonizing its regulatory processes with international standards, promoting predictability and compliance. Thailand, while facing certain procedural complexities, benefits from a well-established regulatory framework and growing initiatives aimed at improving review timelines.

Fig. 5: Average dossier approval timelines following different route of submission



RECOMMENDATIONS

Harmonizing regulatory requirements across different ASEAN countries may streamline the submission and approval process, this could be achieved by adopting of WHO and ICH regulatory practices and standard [58]. Also adopting standardized data management practices i.e use of eCTD, online review platforms and utilizing digital solutions can improve efficiency [58, 59]. Integrating AI and machine learning (ML) in the routine assessment work, at Agency's level, has the potential to minimize human intervention by automating repetitive and rule-based tasks [60]. Adapting the modern technologies and predictive models can really help in speeding up the decision-making as well as overall approval processes by allowing real-time analysis of data, which ultimately will improving overall efficiency. Digital transformation has potential in overcoming delays in dossier approvals [61, 62, 63]. Improving joint assessment initiatives and strengthening mutual recognition of regulatory review already done by other ASEAN Agency could save the time and efforts [64]. This would reduce the duplication of work, speed up the approval process, shorten the approval period and would be an efficient regulatory strategy [65, 66, 67]. Training programmes by Agencies wherein they provide clear guidance, to industry, on any new regulation or topic which act as bottleneck in completing assessment would help both

the Agency as well as the industry and would be a milestone towards timely and accurate submissions [65]. Resource constrain at Agency's side is also one of the factors responsible for delay in assessment and approval; accordingly, Agency should also invest in building capacity and resources to reduce the time taken for dossier evaluations [67, 68, 69]. Addressing issues related to intellectual property (IP) rights is crucial for encouraging innovation, promoting collaboration, and ensuring fair access to generic medicines [70]. This requires timely identification, proper resolution of legal, intellectual property and ownership issues that can slow down or prevent the approval of generics [67].

CONCLUSION

This review article analysed Thailand, Malaysia and Singapore concerning its generic dossier approval process, factor impacting on time approval of dossiers. It is observed that these three countries have made significant progress in progressing and aligning their regulatory review systems, but significant gaps still exist to claim full harmonization. The differences in the dossier submission requirements, review standards and approval timelines among these countries highlights the urgent need for more simplified and consistent regulatory approaches. While Thailand and Malaysia are undergoing growth in their pharmaceutical sectors, both continue to face resource constrain and procedural inefficiencies. Singapore has emerged out with modernization of its systems and effective digital infrastructure; however, its strict nationalized requirements are making hurdles for easy market entry for generics. Unlocking the full potential of the pharmaceutical industry in the ASEAN region will need a collaborative, forward-thinking and an open-minded approach. Key strategies include strengthening regulatory capacity, leveraging digital innovations such as electronic platforms like eCTD, and promoting regional collaboration through joint assessments and mutual recognition. These measures can build the path for a streamlined, efficient and transparent approval process. Furthermore, aligning national regulations with international regulatory standards and framework, such as WHO and ICH, will enhance consistency and promote regulatory convergence across the region. Ultimately, these initiatives will not only improve Agency performance but would also help in ensuring that people across ASEAN region have timely access to safe, effective, and high-quality medicines [71]. By addressing existing gaps and adopting innovation, ASEAN could transform its regulatory landscape into one that supports public health, promotes pharmaceutical innovation, and meets the evolving needs of its diverse populations. Importantly, this review article provides insights that may help ASEAN countries critically evaluate their nationalized regulatory framework, particularly in relation to the review and approval of generic drug applications.

This review also highlights critical gap areas and a need for regulatory harmonization. The findings may serve as a useful reference for ASEAN officials, the ASEAN Secretariat, pharmaceutical companies, researchers, and other stakeholders to understand these identified gaps to have a faster approval for generic drug. Furthermore, the analysis provides insights into how well the generic dossier review process is working in specific areas identified across the three sectoral pillars of the ASEAN Community.

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AUTHORS CONTRIBUTIONS

All the authors have contributed equally.

CONFLICT OF INTERESTS

The authors declare that there are no conflicts of interest in this article.

REFERENCE

1 World Health Organization. (2015). Generic drugs. World Health Organization. https://www.who.int/docs/default-source/medicines/norms-and-standards/guidelines/regulatory-standards/trs1003-annex6-who-multisource-pharmaceutical-products-interchangeability.pdf

2. Dubey, S. (2024). Economic impact of generic drug utilization: A global review of cost-benefit analysis in healthcare systems. Journal of East-West Thought, 14(3). https://doi.org/10.7492/wmx7w560

3. Globela Pharma Pvt Ltd. (n.d.). Generic medicines: Importance, challenges, and the future of affordable healthcare. https://globelapharma.com/generic-medicines-importance-challenges-and-the-future-of-affordable-healthcare/

4. Lee, K. S., Ming, L. C., Lean, Q. Y., Yee, S. M., Patel, R., Taha, N. A., & Kassab, Y. W. (2019). Cross-border collaboration to improve access to medicine: Association of Southeast Asian Nations perspective. Journal of Epidemiology and Global Health, 9(2), 93–97. https://doi.org/10.2991/jegh.k.190506.001

5. Cameron, A., Ewen, M., Auton, M., & Abegunde, D. (2011). The world medicines situation 2011: Medicines prices, availability and affordability. World Health Organization. https://hsrii.org/wp-content/uploads/2014/05/WMS_ch6_wPricing_v6.pdf

6. Feng, K., Miranda, A. V., Obnial, J. C., Ebhodaghe, I. D., & Lucero-Prisno III, D. E. (2024). Drug regulatory harmonization in the Association of Southeast Asian Nations: Is it time for an ASEAN medicines agency? A policy review. Clinical Epidemiology and Global Health,

28, 101649. https://doi.org/10.1016/j.cegh.2024.101649
7. Pharmaceuticals Export Promotion Council of India. (2020, July). Thailand pharma market & regulatory report. https://pharmexcil.com/uploads/countryreports/Thailand_Market_Regulatory_report2020.pdf
8. Insights10. (2022). Malaysia generic and biosimilar pharmaceutical market report 2022 to 2030. https://www.insights10.com/report/malaysia-generic-and-biosimilar-pharmaceutical-market-analysis/
9. Saxena, K., Balani, S., & Srivastava, P. (2022). The role of pharmaceutical industry in building resilient health system. Frontiers in Public Health, 10, 964899. https://doi.org/10.3389/fpubh.2022.964899
10. Aditya, K., Singh, R. K., Kumar, P., Rautela, A., & Ashok, P. K. (2025). Regulatory requirements and drug approval process in India, Europe and US. Journal of Emerging Technologies and Innovative Research, 12(5). https://www.jetir.org/papers/JETIR2505A57.pdf
11. Thambavita, D., Galappatthy, P., & Jayakod, R. L. (2018). Regulatory requirements for the registration of generic medicines and format of drug dossiers: Procedures in Sri Lanka in comparison with selected regulatory authorities. Journal of Pharmaceutical Policy and Practice, 11(14). https://doi.org/10.1186/s40545-018-0141-2
12. ASEAN Secretariat. (2016). ASEAN Common Technical Dossier (ACTD): Guidelines for pharmaceutical registration. Jakarta, Indonesia: ASEAN Secretariat. https://asean.org/wp-content/uploads/2017/03/68.-December-2016-ACTD.pdf
13. ASEAN Secretariat. (2023). ASEAN Pharmaceutical Regulatory Framework (APRF). https://asean.org/wp-content/uploads/2023/11/Final-Clean-Text-APRF_Adopted-AHMM-AEM-5-Apr.pdf
14. Venkateswarlu, B., Nagarjuna, D., Ramaiah, M., Nagabhushanam, M., & Akram, M. V. (2014). Regulatory requirements for the registration of generic solid orals in USA, Singapore, Malaysia and Thailand. Journal of Global Trends in Pharmaceutical Sciences, 5(4), 2225–2232.
15. Handoo, S., Khera, D., Nandi, P., Sahu, S., & Arora, V. (2012). A comprehensive study on regulatory requirements for development and filing of generic drugs globally. International Journal of Pharmaceutical Investigation, 2(3), 99–105. https://doi.org/10.4103/2230-973X.104392
16. International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use. (2016). M4: Common technical document for the registration of pharmaceuticals for human use – Organisation of CTD (Step 4 version). https://database.ich.org/sites/default/files/M4_R4__Guideline.pdf
17. Asia Actual. (2022, August 8). Thai FDA implements initial screening step to submission process. Asia Actual. https://asiaactual.com/blog/thai-fda-implements-initial-screening-step-to-submission-process/
18. Health Sciences Authority. (n.d.). Screening evaluation overview for therapeutic product registration. HSA Singapore. https://www.hsa.gov.sg/therapeutic-products/register/overview/screening-evaluation
19. Freyr Solutions. (n.d.). What is the pharmaceutical products approval process in Malaysia?. https://www.freyrsolutions.com/what-is-the-pharmaceutical-products-approval-process-in-malaysia
20. International Federation of Pharmaceutical Manufacturers & Associations. (2024, December 3–6). Asia Regulatory Conference: Evolving landscapes – Asia's role in driving a more efficient, innovative and patient-centric regulatory environment [Conference presentation]. Online. https://arc.ifpma.org/2024/overview/
21. World Health Organization. (2019). Annex 6: Good practices of national regulatory authorities in implementing the collaborative registration procedures for medical products. In WHO Expert Committee on Specifications for Pharmaceutical Preparations: Fifty-third report (WHO Technical Report Series, No. 1019). World Health Organization. https://www.who.int/publications/m/item/annex-6-trs-1019
22. Thai Food and Drug Administration. (2022, August 8). Initial screening step to submission process. https://asiaactual.com/blog/thai-fda-implements-initial-screening-step-to-submission-process/
23. National Pharmaceutical Regulatory Agency. (2023, July 31). Screening checklist for generics application. https://www.npra.gov.my/easyarticles/images/users/1061/Screening-Checklist-for-Generics-Applicatio_20230731-08Julst_1.pdf
24. Health Sciences Authority. (n.d.). Screening, evaluation and regulatory decision. https://www.hsa.gov.sg/ctgtp/registration/class2/screening-evaluation-rd
25. Health Sciences Authority. (2024). Annual report FY2023/24. https://www.hsa.gov.sg/annual-report
26. Subsittipong, N., Choi, J., Kim, T. H., & Han, E. (2022). Delay in vaccine access in ASEAN countries. International Journal of Environmental Research and Public Health, 19(7), 3786. https://doi.org/10.3390/ijerph19073786
27. Tongia, A. (2018, January 30). The drug regulatory landscape in the ASEAN region. Regulatory Affairs Professionals Society (RAPS). https://www.raps.org/news-and-articles/news-articles/2018/1/the-drug-regulatory-landscape-in-the-asean-region

28. Patel, R., Patel, A., & Gohil, T. (2018). Regulatory requirement for the approval of generic drug in Cambodia as per ASEAN Common Technical Dossier (ACTD). International Journal of Drug Regulatory Affairs, 6(2), 67–71. https://doi.org/10.22270/ijdra.v6i2.245
29. Thai Food and Drug Administration. (n.d.). Pharmaceutical product registration and approval. Ministry of Public Health, Thailand. https://en.fda.moph.go.th/
30. National Pharmaceutical Regulatory Agency. (2025). Drug Registration Guidance Document (DRGD), Third Edition, Tenth Revision: Appendix 14 – Evaluation Routes. Ministry of Health Malaysia. https://www.npra.gov.my/easyarticles/images/users/1153/DRGD%20July%202025/Complete-Drug-Registration-Guidance-Document-DRGD-3rd-Edition-10th-Revision-July-2025.pdf
31. Health Sciences Authority. (2025). Guidance on therapeutic product registration in Singapore (TPB-GN-005-014, Version 14). Health Products Regulation Group, Ministry of Health Singapore. https://www.hsa.gov.sg/docs/default-source/hprg-tpb/guidances/guidance-on-therapeutic-product-registration-in-singapore.pdf
32. OMC Medical. (n.d.). Thai Food and Drug Administration (TFDA) drug approval processes. https://omcmedical.com/thai-food-and-drug-administration-tfda-drug-approval-processes/
33. Pharma Regulatory. (2025, August 6). Thailand (Thai FDA) – Drug approval roadmap: Everything you need to know about regulatory compliance. https://www.pharmaregulatory.in/country-specific-regulatory-affairs/thailand-thai-fda/
34. RamaKishore, E. G., Ravi Shankar, N., Venkatesh, C., & Puranik, S. B. (2022). Marketing authorization and its requirements in Thailand. International Journal of Scientific Research and Modern Education (IJSRM.Human), 20(4), 66–82. https://ijsrm.humanjournals.com/wp-content/uploads/2022/03/5.RamaKishore-E-G-Ravi-Shankar-N-Chagi-Venkatesh-S-B-Puranik.pdf
35. Dixit, P. B., & Maheshwari, D. (2014). Regulatory requirement for the approval of generic drug in Thailand as per ASEAN Common Technical Dossier (ACTD) – A review. Journal of Pharmaceutical Science and Bioscientific Research, [online]. Available at: http://www.jpsbr.org.
36. Credevo. (2018, September 30). Marketing authorization & regulatory requirements for drug registration in Thailand. Credevo. https://credevo.com/articles/2018/09/30/marketing-authorization-regulatory-requirements-for-drug-registration-in-thailand/
37. Patil, M. R., & Venkatesh, M. P. (2018). Harmonization of regulatory requirements for registration of drug products in ASEAN nations. Research Journal of Pharmaceutical, Biological and Chemical Sciences, 9(4), 372–379.
38. APAC Asia. (2024). 6th APAC Regulatory Conference: Session 02–04. https://apac-asia.com/images/achievements/pdf/6th/02-04.pdf.
39. Association of Southeast Asian Nations. (2021). ASEAN guideline for the conduct of bioavailability and bioequivalence studies. https://asean.org/wp-content/uploads/2021/01/ASEAN-Guideline-for-the-Conduct-of-Bioavailability-and-Bioequivalence-Studies.pdf.
40. Association of Southeast Asian Nations. (2018). ASEAN guideline on stability study of drug product (Revision 25th ACCSQ-PPWG). https://asean.org/wp-content/uploads/2018/01/25PPWG-ANNEX-7-iv-Final-ASEAN-Guideline-on-Stability-Study-Drug-Product-R2.pdf
41. AZ Registration. (n.d.). Thailand local authorised representative. https://azregistration.com/thailand-local-authorised-representative/
42. Credevo. (2021, September 25). Medical device regulatory approval in Thailand. https://credevo.com/articles/2021/09/25/medical-device-regulatory-approval-in-thailand/
43. Pacific Bridge Medical. (2024). 2024 Thailand pharmaceutical regulatory update. https://www.pacificbridgemedical.com/publication/2024-thailand-pharmaceutical-regulatory-update/
44. Sandeep, D. S., Sowmya, C. R., Anoop Narayanan, V., & Gowrav, M. P. (2022). Generic drugs regulations and registration in Indonesia, Malaysia and Vietnam: A drug regulatory case study. Journal of Young Pharmacists, 14(1), 33–36. https://jyoungpharm.org/sites/default/files/tmp/JYoungPharm-14-1-33.pdf
45. National Pharmaceutical Regulatory Agency. (n.d.). NPRA annual reports. https://www.npra.gov.my/index.php/en/informationen/annual-reports/npra-annual-reports.html
46. Credevo. (2022, September). Generic drug registration process in Malaysia. Credevo. https://credevo.com/articles/2021/04/15/generic-drug-registration-process-in-malaysia/
47. National Pharmaceutical Regulatory Agency. (2024). Drug Registration Guidance Document (DRGD): Third edition, seventh revision. Ministry of Health Malaysia. https://www.npra.gov.my/easyarticles/images/users/1153/DRGD%20January%202024/Complete-Drug-Registration-Guidance-Document-DRGD-3rd-Edition-7th-Revision-January-2024.pdf

48. National Pharmaceutical Regulatory Agency. (2020). Homepage. Ministry of Health Malaysia. https://www.npra.gov.my/index.php/en/
49. Singapore Food Agency. (2025, April 30). Four food products found to be adulterated with substances not allowed for use in food. https://www.sfa.gov.sg/news-publications/newsroom/2024/four-food-products-found-to-be-adulterated-with-substances-not-allowed-for-use-in-food
50. Panchakshari, N. G., Gande, K. K., & Puranik, S. (2022). Regulatory requirements for pharmaceutical product registration in Singapore. Journal of Comprehensive Pharmacy Research, 14(1), Article 2. https://jcpr.humanjournals.com/wp-content/uploads/2022/03/2.Panchakshari-N-G-Kiran-Kumar-Gande-Sangamesh-Puranik.pdf
51. The Reg Consultants. (2023, August 22). Overcoming the challenges of a generic drug application and registration in Singapore. https://theregconsultants.com/overcoming-the-challenges-of-registration-of-a-generic-drug-in-singapore/
52. Jain, A., Venkatesh, M. P., Reddy, R. M., & Pramod Kumar, T. M. (2015). Regulatory requirements & marketing authorization of generic drugs in Singapore & Thailand. International Journal of Drug Regulatory Affairs, 3(1), 62–74. https://doi.org/10.22270/ijdra.v3i1.158
53. Rodier, C., Bujar, M., McAuslane, N., Patel, P., & Liberti, L. (2021). Use of the Certificate for Pharmaceutical Products (CPP) in 18 maturing pharmaceutical markets: Comparing agency guidelines with company practice. Therapeutic Innovation & Regulatory Science, 55, 118–128. https://doi.org/10.1007/s43441-020-00196-2
54. Health Sciences Authority. (2024, August 16). Common questions related to generic drug applications: Questions and answers relating to bioequivalence (BE) study requirements and Singapore Reference Product (SRP). https://www.hsa.gov.sg/therapeutic-products/register/guides/generic-drug/common-questions-related-to-GDA
55. Smith, Z.P., DiMasi, J.A. & Getz, K.A. New Estimates on the Cost of a Delay Day in Drug Development. Ther Innov Regul Sci 58, 855–862 (2024). https://doi.org/10.1007/s43441-024-00667-w
56. Chow, W. L., Salleh, N. A. M., & Kang, T. S. (2024). Access to innovative medicines: Regulation change and factors associated with drug approval lag in Malaysia. Therapeutic Innovation & Regulatory Science, 58(4), 528–538. https://doi.org/10.1007/s43441-024-00620-x
57. Dellepiane, N., Pagliusi, S., & Registration Experts Working Group. (2018). Challenges for the registration of vaccines in emerging countries: Differences in dossier requirements, application and evaluation processes. Vaccine, 36(24), 3389–3396. https://doi.org/10.1016/j.vaccine.2018.03.049
58. Franco, P., Jain, R., Rosenkrands Lange, E., Hey, C., & Koban, M. U. (2023). Regulatory pathways supporting expedited drug development and approval in ICH member countries. Therapeutic Innovation & Regulatory Science, 57(484–514). https://doi.org/10.1007/s43441-022-00480-3
59. Ajmal, C. S., Yerram, S., Abishek, V., Muhammed Nizam, V. P., Aglave, G., Patnam, J. D., Raghuvanshi, R. S., & Srivastava, S. (2025). Innovative approaches in regulatory affairs: Leveraging artificial intelligence and machine learning for efficient compliance and decision-making. The AAPS Journal, 27(1), Article 22. https://doi.org/10.1208/s12248-024-01006-5
60. Patil, R. S., Kulkarni, S. B., & Gaikwad, V. L. (2023). Artificial intelligence in pharmaceutical regulatory affairs. Drug Discovery Today, 28(9), 103700. https://doi.org/10.1016/j.drudis.2023.103700
61. Chong, S. S. F., Ong, S. H. M., Long, S. M., Kanno, M., Harnpramukkul, U., Wong, K. C., Sathaye, A., Singh, M., Paliwal, M., Do, H., Sou, H., & Binos, R. S. R. (2024). Advancements in regulatory agility, regional collaboration, and digital transformation: Insights from the Asia Partnership Conference of Pharmaceutical Associations (APAC). AAPS Open, 10(14). https://aapsopen.springeropen.com/articles/10.1186/s41120-024-00102-2
62. Fu, L., Jia, G., Liu, Z., Pang, X., & Cui, Y. (2025). The applications and advances of artificial intelligence in drug regulation: A global perspective. Acta Pharmaceutica Sinica B, 15(1), 1–14. https://doi.org/10.1016/j.apsb.2024.11.006
63. Ahluwalia, K., Abernathy, M. J., Algorri, M., Cauchon, N. S., Perico Norred, N. M., & Albert Youssef, R. Y. (2025). The future of regulatory filings: Digitalization. AAPS Open, 11(9). https://doi.org/10.1186/s41120-025-00113-7
64. World Bank. (2017). Improving the availability and affordability of medicines: A synthesis of policies in 15 developing countries (Working Paper No. 106526). https://documents1.worldbank.org/curated/en/727671496171008743/pdf/106526-WP-P144587-OUO-9.pdf
65. Mangia, F., Lin, Y. (M.), Armando, J., Dominguez, K., Rozhnova, V., & Ausborn, S. (2024). Unleashing the power of reliance for post-approval changes: A journey with 48 national regulatory authorities. Therapeutic Innovation & Regulatory Science, 58(997–1005). https://doi.org/10.1007/s43441-024-00677-8
66. Al-Worafi, Y.M. (2024). Generic Medicines Policy in Developing Countries. In: Al-Worafi, Y.M. (eds) Handbook of Medical and Health Sciences in Developing

Countries. Springer, Cham. https://doi.org/10.1007/978-3-030-74786-2_233-1
67. Asia Pacific Medical Technology Association (APACMed). (2021, June 28). Regulatory reliance for the registration of medical devices in Asia Pacific: A case study with Singapore Health Sciences Authority and the Thai Food and Drug Administration. https://apacmed.org/wp-content/uploads/2021/07/HSA-Thai-FDA-APACMed-Reliance-Report.pdf
68. Lim, J. C. W. (2018). Strengthening health products regulatory systems to enhance access to quality health products in the Asia-Pacific. Therapeutic Innovation & Regulatory Science, 52(5), 751–754. https://doi.org/10.1177/2168479018769285
69. Teo, H. S. (2017). Medicines regulatory system. s and scope for regulatory harmonization in Southeast Asia. World Bank Group. http://documents.worldbank.org/curated/en/727671496171008743
70. Credevo. (2024, February 25). Generic drug market in the Asia-Pacific region: Regulations & challenges. https://credevo.com/articles/2024/02/25/generic-drug-market-in-the-asia-pacific-region-regulations-challenges/
71. Skerritt, J. H., Mayer, M., & Francer, J. (2025). Strengthening the use of international collaborative regulatory assessments and regulatory alignment–Implications for global convergence. Therapeutic Innovation & Regulatory Science, 59, 993–1003. https://doi.org/10.1007/s43441-025-00817-8.