Galaxy Publication

Exploring the Impact of Evolving Business Environments on the Trade of Medicinal Plant Products in Tanzania

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ABSTRACT

In Tanzania, the trade of medicinal plant products has developed into a complex rural-to-urban supply network over time, influenced by changes in business environments at both macro and micro levels. At the macro level, shifts in policy and regulatory frameworks have played a significant role, while at the micro level, traders' adaptive responses to these changes and to pandemics have shaped trade practices. Despite this, there is limited documentation on how traders have reacted to these evolving business environments and how the trade has developed over time.This study aimed to align historical changes in the business environment with empirical evidence of how medicinal plant trade has evolved in response to traders' actions in Tanzania. Employing economic evolution theory, the study analyzed the interactions between environmental changes and traders' responses to identify distinct evolutionary stages. Primary data were collected through ten focus group discussions and sixteen in-depth interviews with traders, regulators, and researchers across five regions in Tanzania. Findings reveal that traders adapted by enhancing product presentation and modernizing both their practices and business premises. The study identified four main evolutionary stages of medicinal plant trade in Tanzania: the colonial era (1882–1961), the government supremacy era (1961–1984), the emergence of the private sector (1985–2004), and the market and regulation integration era (from 2005 onwards). Furthermore, a fifth stage is anticipated due to the partial implementation of regulatory frameworks, expected to emerge when regulatory measures and market forces operate in tandem. The study recommends the enforcement of robust regulatory measures to achieve desired outcomes during periods of business environment changes in the traditional medicine sector. This is particularly crucial in preparation for the anticipated fifth stage, which is expected to feature intense competition among traders, necessitating resilient and innovative business models.

Keywords: Critical incidences, Traditional medicine, Business growth, Legitimation of products, Health systems

Introduction

Medicinal plant products (MPPs) have long been employed in diverse cultures worldwide to address a wide range of health conditions [1, 2]. Typically, these products are composed of blends derived from multiple medicinal plants [3, 4] and represent a key component of the traditional and alternative medicine sector, particularly in developing countries [5]. MPPs account for the vast majority—around 95%—of traditional medicinal systems, including African Traditional Medicine, Chinese Traditional Medicine, and Ayurveda [6, 7]. The World Health Organization [8] has acknowledged their significant role in the prevention and management of chronic, lifestyle-related diseases.

The trade and distribution of MPPs constitute a substantial global market, valued at approximately USD 33 billion in 2014, with annual growth rates of 2.4% in volume and 9.2% in value [9]. Within the African context, MPP trade has historically thrived as a local economic activity, with reported trade values ranging from USD 25,900 in Marsabit County, Kenya, to USD 300,000 in Johannesburg, South Africa [10, 11]. In Tanzania, the 2017 trade of

non-wood medicinal plants at Kariakoo Market in Dar es Salaam was estimated at around USD 200,000 [12]. Presently, roughly 400 medicinal plant species are commercially traded across Tanzanian markets [13, 14], with contemporary practices including standardized packaging, dedicated MPP retail outlets, and specialized clinics [15]. These developments largely reflect how traders have adapted to shifts in the business environment over time [16, 17].

The evolution of rural-to-urban supply chains and value networks in Tanzania's MPP trade has been shaped by a combination of regulatory changes and traders' strategic responses [14, 15, 17]. In this context, "business environment" refers to the macro-level factors influencing trade, such as policy, regulatory frameworks, and technological innovations [18]. Key milestones in Tanzania include the transfer of oversight of traditional medicine from the Ministry of Culture to the Ministry of Health in 1989, the inclusion of traditional medicine in the 1999 Health Policy, and the enactment of the 2002 Traditional and Alternative Medicine Act, which led to the establishment of the Traditional and Alternative Health Practices Council (TAHPC) in 2005 [19, 20]. The current structure and operations of the MPP trade are therefore the product of both these regulatory shifts and traders' adaptive strategies [17].

Despite the importance of these developments, little is known about how individual traders have responded to changes in the business environment, the historical evolution of trade practices, and the sector's current state. Prior studies have predominantly emphasized macro-level policy changes before and after independence [16, 17, 19, 20], while the micro-level strategies adopted by traders to meet market demands remain underexplored. Consequently, there is a significant gap in understanding the evolutionary stages of MPP trade in Tanzania over time [16].

This study seeks to integrate historical business environment changes with empirical evidence on traders' responses, addressing two central questions: (i) how have MPP traders adapted to changing business environments over time? and (ii) what evolutionary stages characterize the development of MPP trade in Tanzania leading to contemporary practices? Business evolution theory is applied to examine interactions between environmental changes and trader responses, providing a framework for identifying key trade evolution stages.

The findings are expected to provide actionable insights for supporting MPP trade development by demonstrating how traders respond to environmental shifts. Strengthening the sector aligns with WHO strategic objectives of fostering accessible and high-quality MPPs [8, 21]. Additionally, mapping the evolutionary stages of trade in Tanzania enhances understanding of long-term policy impacts and offers guidance for traders in designing resilient business models, optimizing trade networks, and anticipating future market developments. This paper is structured as follows: Section two reviews relevant literature, section three outlines the theoretical and conceptual framework, section four details research methodology, section five presents study results, section six provides discussion, and section seven concludes with recommendations.

Literature review

The literature review aimed to align macro-level changes in the business environment with the research questions, while also providing empirical evidence on the evolution of MPP trade. The review primarily considered studies conducted in Tanzania. For the literature search, key terms included traditional medicine—also represented by herbal medicine, medicinal plants, and ethnobotany—combined with market-related terms such as trade, commercialization, industry, supply chain, and value chain, and further refined using terms related to evolution, including changes, growth, practices, and regulations. Relevant scholarly databases searched included Science Direct (Elsevier), Web of Science, ABI/INFORM Collection, and Scopus. Additional relevant studies were identified by reviewing citations and reference lists, while unrelated articles were excluded. The literature search and review process was conducted between June and December 2021. As summarized in **Table 1**, relatively few studies addressed the evolution of MPP trade in Tanzania. Given this limited number of publications, a narrative literature review was deemed more appropriate than a systematic review [22].

Table 1. Summary of literature reviewed on changes of business environments of trade in medicinal plants products in Tanzania

Title	Author(s)	Year	Focus/Objective	Key Findings
Regulation of Traditional Medicine in	Kasilo *et al.*	2005	Examines the regulation of traditional medicine practices and products	Over half of African countries have developed national policies including regulation of traditional medicine; 18

the WHO African Region			in Africa and highlights challenges in regulating the sector.	countries have national codes of ethics to ensure safety and quality. However, less than half of these countries have fully implemented these policies. Twenty-one countries established legal frameworks for practitioner accreditation, registration, and councils to oversee traditional medicine practices.
The Traditional Health Practitioner and the Scientist: Bridging the Gap in Contemporary Health Research in Tanzania	Mbwambo *et al.*	2007	Reviews global, regional, and national perspectives on traditional medicine development and integration into health research in Tanzania.	Legal frameworks such as the Traditional and Alternative Medicine Policy (2000) and Act (2002) have been established. Traditional practitioners are increasingly organizing into associations, and collaborative research has narrowed the gap between traditional and modern medical practices.
Recognition and Development of Traditional Medicine in Tanzania	Stangeland *et al.*	2008	Traces the development of traditional medicine legislation and conservation practices in Tanzania.	Traditional medicine is the primary form of healthcare in Tanzania. HIV highlighted the need for cross-sector collaboration. New legislation has formalized recognition, integration, and professionalization of practitioners, offering economic opportunities. Full implementation of these regulations remains uncertain.
From Non-Aligned Medicines to Market-Based Herbals: China's Relationship to the Shifting Politics of Traditional Medicine in Tanzania	Langwick, Stacey	2010	Examines the transition from socialist to market-oriented strategies in Tanzania's traditional medicine sector.	Traditional medicine was initially intended to support indigenous pharmaceutical development in the 1960s–70s. By the 2000s, it re-emerged as a gateway to the global herbal market. China's relationship with Tanzania has played a significant role in this transformation.
Ethnobotanical Knowledge Transmission and Evolution: The Case of Medicinal Markets in Tanga, Tanzania	McMillen, Heather	2010	Explores local ecological knowledge (LEK) of medicinal plants in Tanga markets.	Market participation does not erode knowledge of medicinal plants. Global trends toward commercialization and market economies influence local plant knowledge, management, and use across multiple populations.
Climatic Change and Female Reproductive Health: The Case of Traditional Medicine in Tanzania	Alexander, Nancy	2012	Investigates the impact of climate on medicinal plant use in the Makonde community.	Traditional medicine is widely used across socio-economic groups and geographical areas. It fills gaps left by modern healthcare, is affordable, culturally relevant, and addresses root causes beyond the biomedical perspective.
Prospects and Challenges of Medicinal Plants Conservation and Traditional Medicine in Tanzania	Kayombo *et al.*	2013	Assesses challenges and opportunities in conserving medicinal plants and promoting traditional medicine.	Threats include resource depletion due to population growth, urbanization, agricultural modernization, and climate change. Challenges include limited data on endangered species and inconsistent resource management guidelines. Traditional medicine should be integrated into primary healthcare to meet 2025 health goals.
Babu was Loliondo—Healing the Tensions between Tanzanian Worlds	Vähäkangas, Mika	2015	Analyzes the success and decline of Rev. Mwasapila's medicinal plant ministry.	Highlights medical pluralism in Tanzania. Integration of spiritual and bodily healing by African Christian healers contrasts with Western medicine's body-soul dichotomy.

			Babu successfully bridged this cultural gap.
Vernacular Dominance in Folk Taxonomy: A Case Study of Ethnospecies in Medicinal Plant Trade in Tanzania	Otieno *et al.*	2015	Explores the relationship between vernacular plant names, trader ethnicity, and market trade.	Traditional medicine trade is widespread in rural and urban Tanzania. Most medicinal plant material is wild-harvested, and established supply chains serve urban consumers. Markets are prevalent across the country.
The Quantitative Market Survey of Non-Woody Plants Sold at Kariakoo Market in Dar es Salaam, Tanzania	Posthouwer *et al.*	2018	Assesses sustainability of non-woody medicinal plant trade in Dar es Salaam's main market.	Kariakoo Market is the largest hub for medicinal plant trade with numerous stalls and vendors. Other herbal shops, individual stalls, and mobile sellers exist, including imported and mixed Tanzanian-Arab medicinal products.
Trade of Wild-Harvested Medicinal Plant Species in Local Markets of Tanzania and Its Implications for Conservation	Hilonga *et al*	2019	Examines the trade of wild-harvested medicinal plants and conservation concerns.	Urban and rural markets actively trade a variety of medicinal plant products. Emerging supply chains support distribution across Tanzania.
Properties of (Dis)Possession: Therapeutic Plants, Intellectual Property, and Questions of Justice in Tanzania	Langwick, Stacey	2021	Explores how knowledge and practice of traditional medicine shape justice and modern categorizations.	Traditional medicine remains dynamic, addressing colonial and postcolonial knowledge and political challenges. Despite ongoing struggles, it continues to catalyze growth, resilience, and alternative therapeutic value, reflecting evolving social, scientific, and economic interactions.

The literature indicates that traditional medicine was the sole healthcare system in Tanganyika prior to German colonial rule in 1882 [23]. The introduction of modern medicine by colonial authorities created a pluralistic health system [24]. However, the expansion of modern medicine adversely affected traditional practices due to the perceived complexity and opacity of traditional diagnostic and treatment methods [20]. This situation was exacerbated by the British Colonial Witchcraft Ordinance of 1929, which failed to differentiate between witchcraft and legitimate traditional medicine practices [20]. As a result, traditional medicine largely became clandestine, operating underground [13, 25].

Following Tanganyika's independence in 1961, government initiatives sought to revive traditional medicine, particularly the use of medicinal plant products (MPPs). An early step was the Medical Practitioners and Dentists Ordinance of 1968, which formally recognized traditional medicine [20]. Later, the Department of Traditional Medicine was established in 1976 at the then Muhimbili Medical School and was upgraded to the Institute of Traditional Medicine (ITM) in 1991 [19]. Scholars further note that post-independence development of traditional medicine was shaped by the self-reliance policy and the Tanzania-China partnership [16]. Overall, the evolution of MPP trade and traditional medicine can be conceptually divided into pre- and post-independence phases [16, 19, 20].

The literature also links the growth of MPP trade to the HIV/AIDS epidemic, first identified in Tanzania in 1984 [19, 20]. Before the introduction of antiretroviral therapy (ARVs) in 2004, MPPs were widely regarded as the most accessible and affordable treatments for secondary infections in HIV/AIDS patients [20, 26]. By 1999, approximately 600,000 individuals were estimated to be living with HIV/AIDS in Tanzania [27], representing a substantial potential user base for MPPs due to the limited availability of conventional treatment. Non-governmental organizations (NGOs) initially promoted MPP use among HIV/AIDS patients [26]. The expansion of MPP trade, however, necessitated regulatory oversight for public health protection, culminating in the establishment of the Traditional and Alternative Health Practices Council (TAHPC) in 2005 following initial regulatory efforts beginning in 2000 [19, 20].

Currently, MPP consumption has evolved from community-based exchanges to formal commodity trade across both rural and urban areas, supported by increasingly complex supply networks [4, 14]. The literature highlights

a transition from direct healer-patient interactions to organized supply and value chains. Key nodes in these networks include harvesters, vendors, and formulators, with distribution through retail outlets and herbal clinics [3, 12, 14]. Growth in MPP trade has paralleled increased use for managing non-communicable and chronic diseases, including diabetes [28, 29].

While the reviewed literature provides evidence of an evolving MPP trade, there is limited information on how traders have responded to these changes. The preliminary evolutionary framework, distinguishing pre- and post-independence periods, requires empirical confirmation and further refinement. The literature identifies macro-level changes in business environments—particularly government initiatives and the HIV/AIDS pandemic—as key drivers of trade evolution, but gaps remain regarding the timing, dynamics, and impact of MPP use for chronic and non-communicable diseases on trade patterns.

Theoretical and conceptual framework

Theoretical framework

Evolutionary economics examines how economic activities—including production, distribution, exchange, consumption, and accumulation—undergo gradual transformation and how these changes shape present-day economic conditions [30]. The core idea is that business systems evolve as firms respond to shifts in their external environments, drawing on their internal capabilities to adapt [31, 32]. The theory assumes that no business stage emerges abruptly; rather, each stage develops out of the one preceding it [33].

The concept of economic evolution is inspired by biological evolutionary principles, particularly how living organisms adjust to environmental changes based on their inherent traits [31]. Two classical foundations underpin this thinking: Darwinian evolution, which emphasizes genetic variation and survival of the fittest, and the Lamarckian perspective, which stresses the acquisition and transmission of traits through use. These ideas were extended into economics by scholars such as Freeman and Hannan [34], who adopted Darwinian principles to develop organizational ecology, and Nelson and Winter [32], who used Lamarckian logic to describe dynamic economic change.

This study adopts the Freeman and Hannan [34] framework, which posits that environmental shifts influence an organization's legitimacy and its ability to access resources. Legitimacy, in their view, reflects how suppliers, customers, and other stakeholders perceive an organization's acceptability as an exchange partner. When legitimacy increases, products become socially accepted—or taken for granted—which subsequently enhances survival prospects through stronger demand.

Organizations that survive these environmental pressures then compete for market opportunities, and this competitive struggle stimulates further evolutionary development. Competition functions as a market mechanism that pushes firms toward greater efficiency, diversification, and resilience [34]. Thus, evolutionary stages emerge from the combined influence of legitimacy-related changes in the environment and the competitive interactions among firms.

A key element of Freeman and Hannan's [34] approach is the relationship between legitimation and competition, described through the Density Dependence Model (DDM). According to this model, legitimation and competition exert opposing forces on industry development: legitimation promotes growth by increasing acceptance, while competition constrains growth by intensifying rivalry. The extent to which either force dominates depends on the stage of industry evolution and the number of firms operating within it. Their interaction ultimately influences the expansion, transformation, or decline of firms within a particular trade.

Conceptual framework

This study was informed by the conceptual framework presented in **Figure 1.** The framework highlights legitimation, market/demand, and the interplay between them as the central constructs, with the accompanying boxes outlining the specific elements that constitute each component.
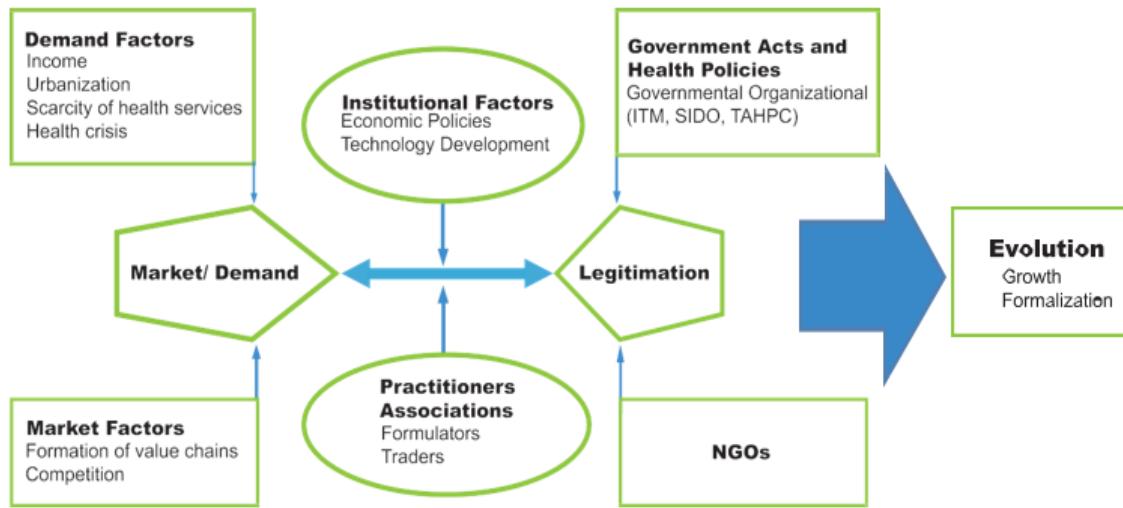
Figure 1. Conceptual framework of evolutionary development of trade in products of medicinal plants in Tanzania.

Consistent with Freeman and Hannan [34], the conceptual framework views the evolution of the medicinal plant products (MPP) trade as driven by shifts in the business environment intended to enhance the legitimacy of MPP consumption. In this study, legitimacy is differentiated into two forms: promotional legitimation and regulatory legitimation. Promotional legitimation refers to government actions that support the development, production, and commercialization of MPPs. Regulatory legitimation, on the other hand, involves government assurances of product safety and quality through testing and oversight. These legitimation roles may also be undertaken by non-state actors, including

NGOs and civil society organizations. Thus, macro-level changes in the business environment are positioned on the legitimation side of the framework.

At the micro level, traders' strategies and adjustments were conceptualized as part of market forces and demand dynamics, aligning with Freeman and Hannan's [34] emphasis on how firms respond to environmental changes. The market/demand construct encompasses traders' behavioral responses, the influence of pandemics, and technological advancements.

The framework also includes two categories of mediating and shaping factors. The first group consists of institutional influences such as economic reforms (e.g., structural adjustment programs) and technological innovations (e.g., mobile phone use). The second group includes practitioner associations, which contribute to structuring and organizing the traditional medicine sector. These factors collectively shape how legitimation and market/demand interact to influence trade practices.

To identify turning points in the evolutionary trajectory of the MPP trade, the study employed the Critical Incident Technique (CIT). A critical incident refers to an event or activity significant enough to allow meaningful interpretation regarding change processes [35]. For an incident to constitute a shift to a new evolutionary phase, it must be both persistent and impactful in altering forms of legitimation and/or competition within the MPP trade [36].

Materials and Methods

Study design
The study relied on qualitative primary data collected from traders of medicinal plant products, complemented by secondary data drawn from the reviewed literature. Its design focused on identifying key incidents that contributed to shifts in the MPP trade, based on insights from traders, regulatory authorities, and researchers active in the traditional medicine sector.

Sample and sampling procedures
The research was conducted across five regions in Tanzania—Arusha, Dar es Salaam, Manyara, Morogoro, and Njombe. Manyara and Njombe were selected to represent predominantly rural contexts, while Morogoro and

Arusha reflected urban environments. Dar es Salaam was included as the national commercial hub. Within each region, two districts were chosen for data collection.

The primary study participants were traditional medicine practitioners who operate medicinal plant product (MPP) shops and clinics, collectively referred to as MPP traders. The sampling strategy followed several steps. District coordinators of traditional medicine provided lists of registered traders, which were then organized according to years of experience, geographic location within the district, and gender, with additional support from association leaders. For each district, ten participants were chosen for focus group discussions (FGDs), ensuring representation from both highly experienced and relatively new traders, diverse locations, and a balance of male and female participants.

Triangulation was built into the design such that issues arising during the FGDs could be explored further through individual in-depth interviews with additional qualified traders who had not participated in the group discussions. These interviewees were purposively selected by the research team. Researchers and regulatory officials involved in traditional medicine were also included in the in-depth interviews and were identified through their respective institutions.

Data collection

Primary data were gathered through ten focus group discussions (FGDs), one held in each selected district. Altogether, 99 MPP traders took part—ten from each district except Ifakara in Morogoro Region, which contributed nine. Of all participants, 46.5% were women and 53.5% were men. Participants' ages ranged from 32 to 76 years. Experience in traditional medicine varied, with the longest-practising trader having 38 years of experience and the least-experienced having seven. Most respondents (69%) had completed primary school, 26% had secondary education, and 5% reported college-level training.

Additionally, 16 in-depth interviews were conducted: one trader from each district (ten in total), three researchers from the Institute of Traditional Medicine (ITM), the Chairperson of the Traditional and Alternative Health Practice Council (TAHPC), and two officials from the Directorate of Traditional Medicine within the Ministry of Health, Community Development, Gender, Elderly and Children (MHCDGEC). Both the FGDs and interviews followed structured and pre-tested guides. On average, FGDs lasted about 90 minutes and interviews approximately 70 minutes. All participants provided informed consent and agreed to audio recording prior to data collection.

Fieldwork took place between April and June 2019 in all regions, except Dar es Salaam where a follow-up FGD was conducted in April 2022 to document how the COVID-19 pandemic influenced the MPP trade. In this second session, three of the initial participants were unavailable and were substituted with new respondents. The overall sample was intentionally diverse, comprising practitioners, regulators, and researchers involved in the medicinal plant products sector.

Data analysis

Data analysis combined content analysis with analytical hierarchy procedures as outlined by Spencer *et al*. [37], supported by NVivo 12 software. Coding focused on identifying incidents within the dataset that demonstrated how MPP traders had acted or adapted over time. These coded excerpts were organized into four principal categories—product, practices, practitioners, and places—representing different dimensions of trader responses **(Table 2).** For each category, traders' responses were chronologically aligned with corresponding changes in the business environment, producing an interaction matrix constructed around the critical incidents identified **(Table 3)**. The matrix comprised two main components: market/demand factors derived from the traders' reported experiences, and legitimation factors synthesized from the literature.

The interaction matrix was then grouped by time periods to form overarching themes—or meta-events—each representing a distinct evolutionary phase. These meta-events were assigned numerical labels signifying the stages of trade evolution. To ensure that these stages were genuinely grounded in the empirical material, they were continuously verified against both written notes and audio recordings.

The resulting evolutionary pattern illustrates how shifts in business environments and institutional dynamics shaped the trade in medicinal plant products. Drawing on Bojnec and Fertő [38], these patterns were interpreted as indicators of broader structural transformation within the trade sector, reflecting changes capable of influencing trade dynamics in the short or long term. Structural change was understood as arising simultaneously from external environmental shifts and the adaptive behaviours of MPP traders.

In this study, evolutionary stages were identified through the concepts of de-coordination, re-coordination, and the emergence of a new order, corresponding to the critical incidents uncovered. De-coordination refers to the initial disruption that creates conditions for change [39]. Re-coordination involves attempts to restore or maintain stability at different levels. The new order signifies the establishment of revised practices, approaches, or organizational arrangements following these shifts.

Results and Discussion

The responses of MPP traders could be grouped into four main categories—products, practices, practitioners, and places **(Table 2).** These themes capture how traders adapted across all dimensions of the medicinal plant products trade. Adjustments to product appearance were the most widely observed changes, consistently reported by participants in both the FGDs and the in-depth interviews. In contrast, shifts in trading locations were more strongly noted by researchers and officials from the MHCGEC during the in-depth interviews than by participants in the FGDs.

Table 2. Response of MPP traders to business changes in business environments based on products, practices, practitioners and places.

Theme of Response	Adaptations by MPP Traders
Products	Began packaging MPPs in modern containers with labels. Produced diverse product forms such as jellies, tablets, soaps, and syrups. Registered products with TAHPC. Developed branded MPPs (e.g., Ngetwa) distributed nationwide. Shifted from broad-spectrum remedies to disease-specific products with defined dosages. Submitted products for certification to agencies like GCLA and implemented controls such as barcodes. Included scientific information on products to enhance legitimacy. MPPs associated with reputable researchers gained the most recognition during COVID-19.
Practices	Transitioned from on-demand preparation to maintaining ready-to-sell stock. Expanded focus from domestic markets to include exports. Initiated cultivation of medicinal plants. Began advertising through radio, television, newspapers, and social media. Integrated mobile phone technology into trade, including mobile money transactions. Attracted investors to participate in trade without daily operational involvement. Adopted modern diagnostic methods before MPP use. Emphasized services like local steaming (nyungu) alongside MPP sales.
Practitioners	Younger individuals increasingly entered the trade, shifting dominance from older practitioners. Other professionals, including medical doctors and pharmacists, joined the MPP trade. Practitioners registered with TAHPC to enhance legitimacy and prevent fraud. Collaboration and referral systems strengthened knowledge sharing among practitioners. Established professional associations for practitioners. Recognition of practitioners became more specialized, based on their role in specific value chain nodes such as harvesting, wholesaling, formulation, or healing.
Places	Began officially registering locations for selling and practicing MPP trade. Trading locations shifted from hidden areas to central urban hubs. Established dedicated herbal clinics and retail shops alongside traditional practice sites (kilinge).

The responses of MPP traders demonstrated their efforts to seize emerging market opportunities. Traders not only enhanced the presentation and packaging of their products but also modernized their operational practices and business premises. Changes in the practitioner profile were driven by the entry of younger individuals and professionals from modern medical backgrounds. The relocation of trade from rural villages to urban centers resulted largely from the formal registration of businesses with government agencies, including tax authorities and local government offices, as highlighted in the in-depth interviews.

These trader responses were organized chronologically and are presented in **Table 3** alongside the corresponding changes in the business environment.

Table 3. Critical incidents, meta events, periods and evolutionary stages of MPP trade in Tanzania.

Critical Incidents	Meta-Event	Period	Evolutionary Stage
1929: Introduction of the Witchcraft Ordinance by the British, undermining traditional health systems	Colonial Era	1882–1961	Stage 1

1963: Relaxation of colonial laws on traditional medicine 1968: Recognition of traditional medicine through the Medical Practitioners and Dentists Ordinance 1976: Establishment of Traditional Medicine Department at Muhimbili Medical School 1980: Founding of the National Institute for Medical Research (NIMR) 1980: Trade in individual medicinal plants (not pre-formulated) began at Kariakoo Market, Dar es Salaam	Government Supremacy Era: Initiatives to revive traditional medicine for self-reliance	1961–1984	Stage 2
1985: Rising demand for MPPs due to the HIV/AIDS epidemic amid limited modern healthcare services 1987: Value addition activities began, including milling of medicinal plants for urban consumers 1990: Traditional healers shifted from rural to urban areas following their customer base 1992: Establishment of supply chains for medicinal plants to support urban healers 1999: Emergence of pre-formulated/readymade MPPs 2000: Introduction of modern container packaging with printed labels Visible cases of fraudulent MPPs, especially in urban markets 1989: Traditional medicines transferred from Ministry of Culture to Ministry of Health 1990: Incorporation of traditional medicine into National Health Policy 1991: Department of Traditional Medicine upgraded to Institute of Traditional Medicine 1995: Registration of practitioner organizations through the Ministry of Home Affairs 1998: Reports of unregulated trade and unregistered practitioners 2000: Formulation of Traditional and Alternative Medicine Policy 2002: Enactment of Traditional and Alternative Medicine Act Involvement of NGOs promoting MPPs to PLWHA	Emergence of a Private Sector	1985–2004	Stage 3
2005: Adoption of modern diagnostic tools through private laboratories, increasing MPP specificity 2009: Growing number of customers seeking MPPs for non-communicable diseases 2012: Increased public visibility of MPP trade due to practitioner and product registration, expansion of service centers and shops Advertisements for formulated MPPs in public media 2015: Special MPP formulations developed (oils, jellies, rubs), modern packaging in tubes and sealed bottles, regulated media advertising 2020: Local steaming services (nyungu) suppressed MPP sales 2020: MPPs with potential COVID-19 applications entered pharmacies and supermarkets 2005: Implementation of Traditional and Alternative Medicine Act Decreased use of Ramli (spiritual-based diagnosis) due to stricter government oversight following cases of harm to people with albinism 2009: Mobile phone adoption facilitated communication and mobile money transfers 2010: Establishment of Traditional and Alternative Health Practices Council enabled registration of practitioners and MPPs 2013: Government recognition attracted investment from non-practitioners into MPP processing 2015: Other government agencies (TMDA, TBS, GCLA) became involved in MPP regulation 2020: Government revealed preparation of COVID-19 remedies 2020: Some regulatory barriers relaxed for distributing COVID-19-related formulations	Regulation and Market Integration	2005–present	Stage 4

The trade of medicinal plant products (MPPs) in Tanzania has progressed through four distinct evolutionary stages, shaped by shifts in the business environment that affected public policies, traders' responses, pandemics, and technological developments. Over time, MPPs transitioned from being communal resources to formally traded commodities within the health sector. Unlike the previously suggested binary classification of pre- and post-independence stages [16, 19, 20], this study identifies four stages: the Colonial Era, the Government Supremacy Era, the Emergence of the Private Sector Era, and the Market and Regulation Integration Era.

The Colonial Era

The Colonial Era spanned from 1882, when the Germans occupied Tanganyika, to 1961, when the territory gained independence from the British. This period was marked by stringent regulations governing the trade of medicinal plant products (MPPs) and the practice of traditional medicine. Notably, the British Witchcraft Ordinance of 1929 failed to differentiate between MPP use and witchcraft, which significantly hindered the development of the MPP trade. The legislation undermined the legitimacy of MPPs and equated herbalists with practitioners of occult practices. This period is recognized as the first stage in the evolution of MPP trade in Tanzania.

The government supremacy era

The Government Supremacy Era extended from 1961, when Tanganyika gained independence, to 1984, just before the implementation of economic structural adjustment policies. This period witnessed the revival of traditional medicine and the formal legitimization of medicinal plant products (MPPs). Government-led initiatives dominated the development of the sector, with the aim of reducing reliance on imported pharmaceuticals. Key institutions were established, including the Department of Traditional Medicines at Muhimbili Medical School in 1976 and the National Institute for Medical Research (NIMR) in 1980.

During this era, the participation of MPP traders remained limited. Focus group discussions indicated that by 1980 only a few market stalls in Dar es Salaam sold raw medicinal plants, and MPP shops were largely absent in other regions. The government's efforts focused on re-coordinating the MPP trade, which had been disrupted during the colonial period. As such, this period represents the second evolutionary stage of MPP trade in Tanzania.

The era of emergence of a private sector

The Era of the Emergence of a Private Sector began in 1985 with the implementation of World Bank-inspired structural adjustment policies, which emphasized a market-driven and private sector-led economy. This era continued until 2004, just prior to the enforcement of the Traditional Medicine Act of 2002. During this period, private sector activities expanded across multiple industries, including

traditional medicine and the trade of medicinal plant products (MPPs). The simultaneous occurrence of the HIV/AIDS pandemic increased the demand for MPPs, accelerating the growth of the trade.

To capitalize on the expanding market, MPP traders adapted by relocating to urban areas, establishing organized supply chains, and modernizing their products through packaging and labeling. Focus group discussions revealed that this era saw the emergence of MPP-based clinics and retail shops in cities. However, the late 1990s also witnessed a peak in fraudulent practices, with fake but well-packaged MPPs circulating in the market.

This period emerged as a result of the de-coordination caused by the structural adjustment policies and the HIV/AIDS crisis, followed by re-coordination efforts by MPP traders who developed supply chains, shops, and clinics to advance the trade. Consequently, this period represents the third evolutionary stage of MPP trade in Tanzania.

In-depth interviews with researchers highlighted that the health potential of MPPs became increasingly evident during this era. Some products effectively addressed secondary infections in HIV/AIDS patients, while the prevalence of fraudulent practices underscored the need for formal regulation and integration into mainstream healthcare. Key regulatory initiatives included transferring oversight of traditional medicine from the Ministry of Culture to the Ministry of Health, incorporating traditional medicine into the National Health Policy, and enacting the Traditional and Alternative Medicine Act of 2002, which became operational in 2005. The Act established the Traditional and Alternative Health Practices Council (TAHPC), tasked with monitoring, regulating, promoting, and supporting the development of traditional medicine in Tanzania.

The era of markets and regulations integration

The establishment of the regulatory framework through the Traditional and Alternative Health Practices Council (TAHPC) marked a turning point in the coordination of MPP trade, which had previously been de-coordinated during the Era of the Emergence of a Private Sector. The re-coordination by MPP traders began in 2005 when TAHPC became operational. This period, referred to as the Market and Regulation Integration Era, represents the fourth stage in the evolution of MPP trade in Tanzania.

During this stage, MPP traders adapted by producing products that complied with regulatory requirements. Focus group discussions in urban areas and market hubs highlighted that MPPs for specific diseases, particularly non-communicable diseases, became increasingly visible. Shops selling MPPs in forms such as tablets, oils, jellies, soaps, and rubs for targeted conditions proliferated. Government institutions, including the Institute of Traditional

Medicine (ITM) and the Small Industries Development Organization (SIDO), supported traders by providing training in processing and packaging MPPs.

The trade networks became more structured and technologically supported, leveraging tools such as mobile phones, printing services, packaging materials, and media publicity. Mobile phone services, for instance, facilitated rural-to-urban trade of raw medicinal plants through voice communication and mobile money transfers. Despite these advancements, compliance with TAHPC requirements remained limited. Registration primarily covered practitioners, while many premises and products remained unregistered due to high costs and involvement of multiple authorities, including the Tanzania Medicines and Medical Devices Authority (TMDA), the Tanzania Bureau of Standards (TBS), and the Government Chemistry Laboratory Authority (GCLA). According to an in-depth interview with the TAHPC chairperson, only about 21,000 practitioners were registered out of an expected 70,000, fewer than 1,000 premises were registered, and only 40 MPPs had completed registration.

Throughout the evolution of MPP trade, changes in the business environment—particularly public policies and regulatory frameworks—played a de-coordinating role across all four stages. Although these changes were intended to legitimize MPP trade, the outcomes were mixed. In the second and third stages, legitimation focused on promoting MPPs, while in the fourth stage, it emphasized regulation to ensure product quality. Partial implementation of regulatory legitimation has resulted in a mixed landscape, where registered and unregistered traders, premises, and products operate alongside one another, creating uncertainty for consumers regarding the quality, safety, and efficacy of MPPs.

Conversely, market demand acted as a re-coordinating force in stages three and four. In stage two, the government led the re-coordination to repair the disruption caused by colonial policies, while in stages three and four, the private sector effectively drove re-coordination, taking advantage of technological advancements and other business environment changes.

Given the partial implementation of regulatory legitimation and the still-developing competition in the MPP market, a fifth stage of trade evolution is anticipated. This stage is expected to represent full commercialization, where regulatory legitimacy and market forces work in tandem. It will likely feature intense competition among registered MPP brands and the full implementation of property rights protections and complete registration of traded products, which could accelerate the transition.

The incomplete application of regulatory legitimation addresses a research gap identified by Stangeland *et al*. (2008) regarding the operationalization of developed regulations. Moreover, this study highlights an additional role for traditional healers' associations, beyond what Mbwambo *et al*. (2007) described: these associations not only participate in shaping regulatory frameworks but also actively promote MPP trade.

The impact of COVID-19 on trade in MPPs

The COVID-19 pandemic highlighted the significance of medicinal plant products (MPPs) during health crises, echoing the surge in MPP use seen during the HIV/AIDS pandemic before the introduction of ARVs, though with different effects on traded products. At the onset of COVID-19, the Tanzanian government promoted the use of MPPs and local steaming practices (nyungu). Institutions such as the National Institute for Medical Research (NIMR) provided guidelines detailing ingredients, formulations, preparation methods, and recommended medicinal plants for nyungu. Muhimbili National Hospital even set up a modern facility to carry out nyungu procedures. Consequently, many people prepared remedies at home and relied less on MPP traders. Commonly used ingredients included ginger, garlic, and lemons, readily available in local markets. Some traditional medicine practitioners also received training on the proper administration of nyungu.

A limited number of MPP formulations developed by prominent researchers and government institutions, such as Prof. Hamis Malebo's COVIDOL, Sokoine University of Agriculture's SYNADOL, and NIMR's NIMRCARF, were approved for distribution in pharmacies and supermarkets without bureaucratic barriers. However, these products were rarely available once the spread of COVID-19 slowed. As a result, although the pandemic temporarily boosted interest in MPPs, its impact on the trade was short-lived, and the production of several products was halted. Overall, COVID-19 had minimal influence on advancing MPP trade practices to a new evolutionary stage, largely due to the rapid development of vaccines and the relatively brief duration of the pandemic.

Conclusion

Medicinal Plant Products (MPPs) have been utilized across cultures for treating various diseases since time immemorial. In Tanzania, the trade of MPPs has evolved into a complex rural–urban supply network shaped over time by multiple changes in business environments, which have influenced current practices. Despite this, the ways in which MPP traders responded to these environmental changes and the evolutionary trajectory leading to the present state have been poorly understood. Understanding these evolutionary stages is crucial not only for identifying factors that drive changes but also for evaluating the impact of policies over time.

This study applied economic evolution theory and the concept of business environments from a strategic perspective to address two key research questions regarding MPP trade in Tanzania: (i) How have MPP traders responded to changes in business environments over time? (ii) What are the evolutionary stages of MPP trade in Tanzania up to current practices? The findings reveal that MPP traders responded by enhancing the appearance of their products and modernizing both their practices and business premises. Changes among practitioners were driven by the entry of younger generations and professionals from modern medicine. While changes in business environments initially caused de-coordination, private-sector MPP traders re-coordinated their operations to seize market opportunities created by pandemics, leveraging technological advancements in the process.

The study identified four evolutionary stages of MPP trade in Tanzania: the Colonial Era (1882–1961), the Government Supremacy Era (1961–1984), the Emergence of the Private Sector Era (1985–2004), and the Market and Regulation Integration Era (starting in 2005). Due to partial implementation of regulatory legitimation and the nascent competition among traded MPPs, a fifth stage of trade evolution is anticipated, characterized by full commercialization in which market forces and legitimation mechanisms will operate synergistically.

The study recommends establishing incentives and proper enforcement mechanisms to ensure desired outcomes whenever business environment changes occur in traditional medicine, safeguarding both health and economic security. The roles of mediating institutions such as ITM, SIDO, and practitioners' associations in the interaction between legitimation and market demand should be strengthened. Additionally, given the expected fifth stage, raising awareness of intellectual property rights and branding for MPPs should be prioritized. Future research could explore potential business models to enhance firm survival and sustainability amid intense competition.

A limitation of this study is the exclusion of MPP consumers, whose perspectives could provide a more balanced understanding of the trade's evolution. Considering consumers' experiences and views on traded MPPs is recommended for further research, particularly in characterizing the anticipated fifth stage.

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