Pubmedia Social Sciences and Humanities Volume: 3, Number 2, 2025, *Page*: 1-20

# The Silence of the Mind: Intellectual Stagnation and the Unmaking of an Empire

**Hasbi Yusron[1], Kurniawan Arif Maspul[2]***

[1] Islamic University of Madinah
[2] Al-Madinah International University

DOI: https://doi.org/10.47134/pssh.v3i2.523
*Correspondence: Kurniawan Arif Maspul
Email: ck885@lms.mediu.edu.my

Received: 30-08-2025
Accepted: 30-09-2025
Published: 30-10-2025



**Abstract:** This paper posits that the Ottoman Empire's decline was fundamentally rooted in a profound intellectual crisis, a deeper malady beneath its political and military failures. Employing an Ibn Khaldun-inspired civilisational lens, we argue that the empire entered a terminal phase marked by epistemological, institutional, and applied stagnation. The analysis traces this trajectory through poignant symbols: the state-sponsored destruction of the Istanbul Observatory in 1580, which extinguished empirical research; the deliberate delay in adopting the printing press due to religious and guild resistance; and a vast knowledge gap evidenced by a 1:38 library volume ratio with France. This intellectual closure crippled adaptive capacity, transforming a once-dynamic culture of integrated learning into a system of rote repetition and doctrinal rigidity. The empire's eventual collapse serves as a stark historical lesson on the non-negotiable role of a living, questioning intellectual tradition for state survival, with urgent implications for modern nations struggling to build resilient knowledge ecosystems.

**Keywords:** Intellectual Stagnation, Civilizational Decline, Epistemological Shift, Knowledge Gap, Ottoman Decay

## Introduction

There is a particular tragedy in the fall of a great civilisation that extends far beyond lost territories or fallen dynasties. It is the tragedy of a silenced mind, a stifled curiosity, a people who once led the world in inquiry but, in their final centuries, found themselves unable to even keep pace. The Ottoman Empire's protracted decline from a global superpower to the 'Sick Man of Europe' presents a classic tableau of political fragmentation, military defeat, and economic enfeeblement. For centuries, observers have meticulously catalogued these symptoms—the lost wars, the crumbling treasury, the nationalist secessions. Yet, to diagnose the empire solely through these manifest ailments is to mistake the fever for the disease. Beneath the surface of these crises festered a deeper, more insidious malady: a profound and systemic intellectual stagnation that crippled the empire's capacity to perceive, understand, and adapt to a rapidly modernising world (Evrensel & Minx, 2017) (Şentürk, 2007). This was not merely a consequence of decline; it was its fundamental root, a structural fault line that amplified every shock and made sustainable recovery increasingly elusive.

To comprehend the full gravity of this crisis, we must adopt a vision of history that sees empires not just as political or military constructs, but as intellectual ecosystems. The great 14th-century scholar Ibn Khaldun provided precisely this lens with his theory of human civilisation (*ʿumrān*). He conceived of societies as organic entities that move through cycles: from the dynamic, creative momentum and potent "group solidarity" (*asabiyyah*) of their birth, to a phase of luxury and stability, and finally into a period of rigidity and decay, when the impetus for renewal dwindles and institutions become ossified shells of their former selves (Ibn Khaldun, 1981). From this vantage point, the Ottoman Empire's intellectual paralysis is not an isolated educational failure but the clearest diagnostic marker of a polity entering the terminal, calcified phase of its civilisational cycle. It is the story of how transmission displaced inquiry, how ritual supplanted reason, and how a culture of learning became a culture of repetition (Berghout & Berghout, 2015).

The stakes of this historical inquiry could not be higher, for the Ottoman experience is not a closed chapter but an open warning. In today's globally connected yet deeply unequal world, the gap in scientific and technological capacity between nations is not narrowing fast enough. According to the United Nations Educational, Scientific and Cultural Organization [UNESCO], more than 80% of countries spend less than 1% of their GDP on scientific research and experimental development, creating a 'research desert' that mirrors the Ottoman knowledge deficit (UNESCO Institute for Statistics, 2021). The World Bank (2018) further warns that without robust "knowledge capital"—the skills, institutions, and innovation systems that drive economies—countries in the Global South risk permanent peripherality in the global economy. The Ottoman Empire is a historical case study of this precise peril. Its journey from a state that once integrated the rational sciences of mathematics, astronomy, and medicine into its core curriculum under Suleiman the Magnificent (Khuluq, 2005) to one that, centuries later, struggled to adopt the printing press and demolished its premier observatory, offers a masterclass in how a civilization can voluntarily disarm itself intellectually (Tekeli, 2008) (Popescu & Popa, 2022).

This study, therefore, posits that the intellectual crisis was the foundational root cause of the Ottoman decline. It will dissect this crisis across three interlocking dimensions: the epistemological (a shift from creative, problem-solving knowledge to rote memorisation and doctrinal rigidity), the institutional (the fossilisation of madrasas and the creation of a fractured, dual-education system), and the applied (the failure to translate thought into technological and organizational innovation). We will trace this trajectory through poignant symbols: the heartbreaking destruction of the Istanbul Observatory in 1580, a world-class scientific facility razed by political and theological intrigue, which extinguished state-sponsored empirical research for centuries (Bağa, 2021) (Ozçep, 2021); the delayed adoption of the printing press, a story of how religious sensitivities and guild protectionism throttled mass access to knowledge for generations (Kenan, 2020; Rassi, 2021); and the stark statistical reality of a vast knowledge gap, where by 1897, the entire Ottoman Empire housed only 193,000 library volumes compared to France's 7.3 million in 1880—a disparity ratio of nearly 1:38 (Şentürk, 2007) (Lahti et al, 2019).

This is more than an academic exercise. It is an urgent, emotionally charged inquiry into how a civilisation loses its way. The Ottoman echo resonates today in the struggles of many nations to build resilient education systems, protect academic freedom, and foster homegrown innovation. As the RAND Corporation (2023) argues, a nation's security and economic vitality are directly tied to its 'innovation capacity', which is itself a product of its intellectual vitality. The Ottoman story is a powerful, heartbreaking testament to the inverse: that when a state's intellectual traditions wither, its armies, its economy, and its diplomacy become brittle. By examining the silence that fell over the Ottoman mind, we seek not just to understand a fallen empire, but to illuminate the indispensable, non-negotiable role of a living, questioning, and adaptive intellectual tradition in the survival of any state in an unforgiving world.

## Methodology

This study employs a qualitative historical research design, grounded in a systematic and critical literature review, to investigate the Ottoman Empire's intellectual stagnation as a root cause of its decline. The methodology is primarily hermeneutic, focusing on the interpretive analysis of a wide range of primary and secondary sources, including Ottoman edicts, scholarly tracts like those of Katib Çelebi, institutional records of madrasas and libraries, and modern academic historiography in both English and Arabic. This approach facilitates a deep, contextual understanding of the epistemological and institutional shifts within the Ottoman learned class, aligning with the theoretical framework of civilisational cycles proposed by Ibn Khaldun. By critically synthesising this body of literature, the study identifies patterns, themes, and causal relationships between intellectual closure and socio-political decline, constructing a coherent historical narrative that is both analytically rigorous and accessible to scholars in the field of Islamic civilisation. This method is particularly suited for advanced research in Islamic history, as it emphasises textual criticism and conceptual analysis over quantitative data, enabling a nuanced exploration of ideological and educational transformations (Tosh, 2023) (Elton, 2018).

## Result and Discussion

In the Ottoman Empire's final centuries, a sequence of crises — political retrenchment, military defeats and economic deterioration — threatened the very fabric of the state. These symptoms were plainly visible; indeed, contemporaries and later observers even came to label the empire 'the sick man of Europe'. Yet beneath those surface troubles lay a deeper, more corrosive malady: an intellectual stagnation. This paralysis in the realms of knowledge, science and technological adaptation was not merely an incidental effect of decline but, I will argue, a structural factor that helped to entrench a destructive feedback loop. It blunted the empire's capacity to innovate, to adapt and to craft effective responses to a modernising world dominated increasingly by ascendant European powers (Evrensel & Minx, 2017).

This study adopts Ibn Khaldun's framework for understanding the rise and fall of states through the concept of human civilisation (ʿumrān). Ibn Khaldun conceives civilisational cycles in which societies move from creative momentum and collective solidarity to luxury and stability, and finally into rigidity when the impetus for renewal dwindles (Ibn Khaldun, 1981). From this vantage point, the Ottoman intellectual crisis is not only an educational anomaly; it is symptomatic of a polity entering the latter, ossified phase of its civilisational cycle — a phase in which transmission increasingly displaced critical inquiry, educational institutions fossilised, and incentives for scientific creativity dwindled. Intellectual stagnation thus becomes the clearest mirror of a state's slide from dynamism to calcification. This paper examines that process in its historical and institutional context.

It should be emphasised that the intellectual crisis was not the sole cause of the Ottoman collapse. Rather, it functioned as the deeper structural faultline that amplified political, economic and military failures and made sustainable remedies more elusive. The focus here is on how that intellectual paralysis manifested, the damage it wrought, and the reactions it provoked — reactions that, cumulatively, helped to hasten the empire's disintegration.

**The Ottoman Educational System Before Decline — The Role of Madrasas and the Learned Class**

At its height, the Ottoman state built a robust and relatively well-structured educational system, with the madrasa at its core. An extensive network of schools — particularly in newly integrated territories — underpinned the empire's strategy for consolidating authority. Many of these institutions were financed through the waqf (vakıf) system, an endowment mechanism that provided them with financial stability and a degree of insulation from the short-term fiscal vicissitudes of the central treasury (Karataser, 2017; Nasirova, 2024).

Madrasas were not merely centres for religious learning; they were instrumental in producing the administrative and juridical cadres that the state required. Graduates entered the bureaucracy as judges (*kadi*), jurists (*mufti*), teachers (*müderris*) and clerks, forming the learned class (*ilmiye*). This class commanded significant prestige and influence within both state structures and society at large. Authority over religious and legal interpretation rested with the Shaykh al-Islam (*Şeyhülislam*), whose reach extended into many aspects of public and private life (Saleh, 2025).

Istanbul emerged as the intellectual hub, attracting scholars and thinkers from across the Islamic world. Sultan and ministerial patronage of prominent schools channelled resources and talent into these centres of learning. At its zenith, the system therefore constituted a substantial intellectual infrastructure through which the state could supply itself with able administrators and respected religious authorities. However, the waqf's financial autonomy, while initially a source of resilience, later contributed to institutional inertia: endowed institutions with independent funding streams were sometimes resistant to curricular reform or state-directed modernisation (Karagoz, 2018).

**The Initial Balance Between Revealed and Rational Sciences**

Contrary to the static image sometimes associated with the empire's later centuries, the Ottoman educational system in its golden age sustained a healthy, pragmatic balance between transmitted (*naqli*) religious sciences and rational (*aqli*) disciplines. Under visionary rulers such as Mehmed II (Mehmed the Conqueror) and Suleiman the Magnificent, advanced colleges — notably the Sahn-ı Seman complex — taught an integrated curriculum. Students engaged not only with Qur'anic studies, hadith and jurisprudence, but also with logic, philosophy, mathematics and astronomy (Khuluq, 2005; Karagoz, 2018).

This balance was not an indulgence; it was a strategic necessity. Governing a vast, multi-ethnic empire demanded officials who could do more than adjudicate religious law: they needed skills in arithmetic for taxation and land administration, in astronomy for navigation and the calculation of prayer times, and in formal logic for sound legal reasoning and bureaucratic decision-making (Turamanlar, 2023). A lively translation movement complemented these efforts, as important manuscripts in Arabic, Persian and Greek were rendered into Ottoman Turkish and made accessible to a broader audience. The intellectual tradition that continued elements of the Seljuk legacy therefore evolved into a sophisticated, serviceable system.

At its apogee, this educational apparatus produced an administratively competent and intellectually agile class capable of managing a complex polity and engaging with external knowledge currents. The later deterioration, therefore, should be seen not as the inevitable absence of such capabilities but as a failure to sustain the pragmatic adaptability that had once been a hallmark of Ottoman statecraft (Kerr & Germani, 2018).

**Evidence and Manifestations of Educational and Intellectual Decline**

As the eighteenth century unfurled, the educational and intellectual landscape of the Ottoman polity began to show unmistakable signs of fatigue. The pragmatic balance that once held between transmitted, revealed knowledge and rational inquiry eroded. In its place grew a dominant, conservative pietism: curricula that prized ritual and repetition over reasoning, pedagogies that rewarded memory rather than critical engagement, and institutions that, once sources of pride, fell into inertia and decay.

Perhaps the clearest evidence of this crisis lies within the walls of the madrasas themselves. A broad scholarly literature documents a marked narrowing of curricula across the eighteenth and nineteenth centuries, with a near-exclusive focus on traditional religious sciences and a corresponding marginalisation of rational disciplines — advanced mathematics, the natural sciences and comparative scholarly debate (El-Rouayheb, 2015; Hassan, 2021). This was not merely an archival observation by later historians: contemporaries such as Katib Çelebi (*Hacı Khalifa*) contested these trends in print. In his tract *Mīzān al-Ḥaqq fī ikhtiyār al-Aḥaqq*, Çelebi openly criticised the anti-rationalist currents associated with the *Qāḍīzāda* movement, arguing that the abandonment of logic, mathematics and philosophy lay at the heart of the empire's weakened capacity to confront a rising Europe (Zilfi, 1988; Çelebi, 2009).

Teaching methods hardened in the same period. Education shifted from an enterprise of questioning and understanding to one of memorising canonical texts — students were often required to rote-learn primary works before being permitted to consult commentaries, and the intellectual tools of systematic reasoning were increasingly absent from the classroom (Kamer, 2020; Sentürk, 2007). The perceived closure of the gate of ijtihād (independent reasoning) institutionalised a self-reinforcing conservatism: a generation of scholars and bureaucrats emerged who were trained to reproduce a static tradition rather than to adapt it. This produced officials who struggled to diagnose and respond to the complex technical and organisational challenges posed by European modernity — prompting later reformers to import entire educational models wholesale, thereby creating the uneasy bilingualism of nineteenth-century Ottoman schooling (Gürhan & Çiftçi 2021; Canaklı & Alabay 2022).

**Delay in adopting transformative technologies: the printing press as a case study**

The intellectual insularity of the age is perhaps most vividly illustrated by the belated and fraught adoption of the printing press. Movable-type printing in the Ottoman script did not gain an official foothold in Istanbul until Ibrahim Muteferrika's press was licensed in 1729 — nearly three centuries after Gutenberg's innovation in Mainz (Popescu & Popa, 2022). Muteferrika's campaign to introduce printing was not a crude mimicry of the West; his pamphlet *Vasīlatü't-Tıbā'a* (c.1726) framed the technology as a pragmatic tool to preserve texts more accurately than error-prone manuscript copying, to make non-religious works — dictionaries, geography, histories — more affordable for students, and ultimately as a kind of intellectual defence against Europe's scientific advance (Kenan, 2020; Berkes, 1964).

Yet the road to permission was long and contested. Conservative scholars feared that mass printing would profane sacred texts and undermine the sanctity of hand-written transmission; the economic resistance of the copyists' guild — a vast labour constituency whose livelihood depended on the manuscript trade — proved equally decisive (Popescu & Popa, 2022). The compromise that followed was telling: the state allowed printing under strict limits, banning the press from printing the Qur'an, hadith collections and major juridical works, thereby choking the potential market and forestalling a robust printing industry for well over a century (Rassi, 2021; Titleman, 2024). Muteferrika's modest output between 1729 and 1745 — some seventeen titles and roughly 12,000 copies — stands as a poignant symbol of a polity hesitant to embrace a technology that elsewhere was transforming access to knowledge (Kenan, 2020).

This was not merely a technophobic moment; it revealed the interplay of religious sensitivities, organised economic interests and a centre that was insufficiently assertive to carry through disruptive reforms. The decision reflected, too, a deeper disposition: where innovation threatened established ritual, authority or livelihood, conservatism triumphed (Başaran, 2023; Popescu & Popa, 2022).

**The decline of scientific institutions: the symbolic turning point of the Istanbul Observatory**

If curricular narrowing and the printing-press stalemate were slow erosions, the destruction of the Istanbul Observatory in 1580 stands as a more dramatic, emblematic rupture. Founded in 1577 by Taqī al-Dīn Muhammad ibn Maʿrūf and patronised by Murad III, the observatory was one of the most advanced astronomical research facilities of its era, equipped with sophisticated instruments and capable of making measurements that rivalled contemporary European work (Bağa, 2021; Tekeli, 2008; King, 2000).

Its demolition after only three years — under pressure from court intrigues and the conservative ulama, led by the influential Shaykh al-Islam Qāḍīzāda — was precipitated by a comet in 1577 and the misfortunes that followed. Taqī al-Dīn's astrological reading of celestial signs as auspicious was seized upon by opponents; accusations that astronomical inquiry bordered on impermissible divination, and that the grandeur of the observatory constituted wasteful innovation, furnished the pretext for its destruction (Mahmoud, 2021; Silverman & Limor, 2021).

Reading this episode merely as a triumph of superstition over reason is too crude. The opposition's jurisprudential critique was coherent within its own logic: elements of Qāḍīzāda thought objected primarily to the mixing of astrology with legitimate computational astronomy and to ostentatious patronage that could be construed as bidʿa (religious innovation) or fiscal excess (Zilfi, 1988). Nonetheless, the political result was devastating: the removal of state sponsorship for a bold scientific project sent a chilling message. Researchers and patrons learned that certain lines of inquiry were politically hazardous; state protection for high-risk, high-reward scientific work evaporated. Consequently, precise observational astronomy in the Ottoman lands languished for roughly two centuries, at the very moment that Europe accelerated through the scientific revolution with Kepler, Galileo and Newton. The obliteration of the observatory, therefore marks a shift from active cultivation of the sciences to a posture of caution and suppression, leaving an intellectual scar difficult to heal (Ozçep, 2021).

**Literacy, libraries and a widening knowledge gap**

The cumulative impact of curricular retrenchment, technological reticence and institutional suppression can be traced in stark quantitative indicators. A misaligned education system and the social preference for artisanal apprenticeship over schooling contributed to high illiteracy rates; indeed, Sultan Mahmud II's decree urging parents not to bar their children from attending school is itself telling of how undervalued systematic education had become prior to the nineteenth-century reforms (Sentürk 2007; Menekşe 2022).

Perhaps the most eloquent measure of the knowledge gap is found in library statistics. The first Ottoman statistical yearbook (1897) recorded 324 public libraries across the empire, holding approximately 193,000 volumes — only about 49,000 of which were printed; the remainder remained manuscript copies (Sentürk 2007). By contrast, France

alone in 1880 held some 505 libraries with a combined total of roughly 7,298,000 books. Such a comparison yields a sobering ratio — on the order of 1:38 in favour of a single European state — and speaks to the reversal of fortunes since the medieval period, when Islamic libraries had often been richer than their European counterparts (Lahti *et al*., 2019; Ozçep, 2020).

These figures are not abstractions. They signpost a material disadvantage: an Ottoman scholar, official or craftsman had access to far fewer printed resources than a contemporary in Paris or London. The shortage of accessible, up-to-date materials throttled research, constrained innovation and slowed the diffusion of new ideas. Even when Ottoman intellectuals sought European learning, the limited domestic infrastructure pushed the state to send students abroad rather than to develop equivalent capacities at home — a tacit admission that certain kinds of modern knowledge were no longer reliably obtainable within the empire's own institutions (Popescu & Popa, 2022; Şişman, 2009).

Moreover, the second chapter's evidence — institutional, technological and statistical — paints a picture of an empire progressively closing the doors to its own intellectual renewal. The narrowing of curricula, the timid embrace of printing, the symbolic ruination of the observatory and the blunt reality of a shallow library network together created a dense fog that obscured routes to adaptation. These were not accidental failings; they were the by-products of intertwined social, economic and theological dynamics that together slowed the Ottoman response to a changing world. The following chapter will examine how these intellectual constraints shaped reformist responses in the nineteenth century — reforms that were as earnest as they were contested — and how they ultimately reframed the empire's last attempts at reinvention.

**Analysing the Causes of Decline**

Tracing the trajectory of education and intellectual life in the late Ottoman centuries reveals that the crisis was not simply a matter of shrinking curricula or diminished resources. It was, more profoundly, a shift in the very cognitive architecture that produces knowledge and steers civilisational action. When scientific institutions stop being sites of enquiry and become instruments of repetition, a polity — in Ibn Khaldun's terms — has entered a phase of stagnation in its ʿumrān: creative capacities wither, science becomes decorative rather than instrumental, and knowledge loses its capacity to reconfigure practice. Seen this way, the educational and intellectual shifts of the Ottoman polity were not isolated mishaps but signals of a wider civilisational realignment that reached its height in the eighteenth and nineteenth centuries. Reform and recovery were therefore never a foregone conclusion; they were choices made under pressure and constraint (Evrensel & Minx, 2017).

**The levels and forms of the intellectual crisis**

The intellectual crisis that beset the late Ottoman state manifested across three interlocking levels.

First, there was an epistemological rupture. Knowledge ceased to function principally as a creative, problem-solving faculty and instead became an act of repetition. Experimental and empirical inquiry receded — as the fate of the observatory shows — and scholarly attention narrowed away from the kinds of enquiry that underpin technological and organisational renewal. This was a crisis of the mind: a loss of the habit of questioning and testing (Berghout & Zakia Berghout, 2015; Şentürk, 2007).

Second, an institutional crisis emerged. Madrasas and learning institutions ossified: curricula hardened, links between religious and rational sciences frayed, and parallel modern schools — military, naval and civil — arose with little integration or shared intellectual life. The result was not only fragmented education but a bifurcated elite whose training did not translate into a coherent national capacity. What had once been a system capable of producing versatile administrators and thinkers became a set of bureaucratic mechanisms that reproduced themselves (Doah, 2024).

Third, there was an applied or practical crisis. Intellectual stagnation translated into economic and military weakness: the state became a net importer of technology, lacking the endogenous capacity to adapt, refine or produce technical solutions. Where thinking should have informed doing, the reverse happened: imitation without comprehension, adoption without absorption. The three levels combined to entrench a civilisational decline consistent with Ibn Khaldun's account of cultures slipping from innovation into ritualised repetition (Berghout & Berghout, 2015).

**Internal drivers: conservatism, intellectual closure and institutional decay**

The roots of this decline lie, in significant part, in internal dynamics. Chief among these was a cultural shift within the ruling elite and learned classes toward conservatism, sectarian rigidity and a resigned acceptance of fate. An intellectual climate that valorised protective distance from European influence came to predominate: novel ideas were often dismissed in advance as corrupting imports from an allegedly godless West. That posture created an intellectual insulation that made cross-fertilisation of knowledge difficult and undesirable (Shafir, 2019; Çolak, 2024).

Far from being accidental, this posture was organised and purposeful. The Qāḍīzāda movement in the seventeenth century exemplified a conscious puritanical campaign that aimed to excise what it saw as religious innovations and to delegitimise rational sciences that were judged unnecessary for piety. Its political success — which, for instance, helped seal the fate of the Istanbul Observatory — demonstrates how doctrinal movements can translate into structural constraints on inquiry (Zilfi, 1988; El-Rouayheb, 2008).

Institutional deterioration at the top of the polity reinforced these tendencies. From the late sixteenth century onward, many sultans lessened their direct engagement with intellectual patronage; power became more mediated through ministers, often corrupt or

incompetent, and the incentive structures that once favoured talented administrators unravelled. Bureaucratic decay, graft and short-term fiscal pressures diverted attention and resources away from education and research (King, 2024; Akiba, 2024). The cumulative effect was a vicious cycle: weaker institutions produced lower quality graduates, who in turn staffed institutions unwilling or unable to innovate (Kamer 2020).

Economic strain deepened the problem. Shifts in global trade routes, protracted military engagements and fiscal crises reduced the state ability to underwrite education and scientific endeavour. Declining funding sapped morale, diminished pedagogical quality and widened the gap between aspiration and capacity. Thus, conservatism, administrative decline and economic pressure did not operate in isolation but mutually reinforced one another, producing a closed system resistant to reform (Evrensel & Minx 2017).

**Western shock and the painful recognition of lagging behind**

Internal dynamics set the stage; external pressures supplied the shock. Repeated military reverses, especially against Austria and Russia across the eighteenth century, were a brutal reality check. They forced Ottoman policymakers to confront a stark truth: European military superiority was not merely a matter of tactics but rooted in deeper advances in science, technology and organisational practice (Saleh, 2025).

Equally significant was the expanding political and economic penetration of Europe — through capitulations, extraterritorial privileges and unequal commercial arrangements — which eroded fiscal sovereignty and created new dependencies. These pressures heightened the urgency for reform and shaped its character: pragmatic, defensive and often top-down. Educational modernisation therefore began with militarily oriented institutions — engineering corps, naval academies, medical schools — a reflection of the immediate needs of survival rather than a systemic embrace of intellectual renewal for its own sake (Saharuddin *et al*., 2019; Al-Kassimi,2021; Akbaş, 2012).

This reactive posture meant that reform frequently sought external forms rather than internal transformations: modern curricula were copied, foreign instructors imported, and European models were adopted in appearance if not always in substance. The result was a partial, sometimes brittle modernity that helped address short-term deficits but left deeper epistemic and institutional questions unresolved (Çelebi *et al*., 2018).

Viewed through this analytic lens, the Ottoman collapse appears less as an inexorable outcome of external force alone and more as the culmination of a longer civilisational process. The state did not first lose its territory and then its capacity to think; rather, its diminishing capacity to produce and renew knowledge made political and military recovery harder to conceive and execute. In short, the end of the Ottoman state was preceded, and in important respects precipitated, by an earlier loss: the loss of a living intellectual tradition that could imagine and implement alternatives. The final chapters of this study will explore the complex reform efforts of the nineteenth century — their promise, their limits and how they were shaped by the very crisis they sought to remedy.

**Responding to the Crisis: Nineteenth-Century Educational Reform**

Faced with an existential dilemma — a widening technological and military gap with Europe — Ottoman leaders in the nineteenth century launched a bold and, at times, anxious campaign of educational reform. What began under Sultan Mahmud II and was systematised during the Tanzimat represented the most radical reconfiguration of Ottoman schooling in memory. The aim was stark and urgent: to produce a new cadre able to master modern sciences and technologies and, in doing so, to rescue the state from terminal decline (Doan, 2024).

**1. Sultan Mahmud II's pioneering reforms (1808–1839): the first steps of modernisation**

Sultan Mahmud II is widely acknowledged as the architect of early Ottoman modernisation. He recognised that traditional schools, with their narrowed curricula and doctrinal methods, could no longer supply the state with the expertise it urgently required. His reforms therefore unfolded on two politically delicate tracks. On the one hand, he sought to reform the existing system — introducing general subjects into madrasa syllabuses, making school attendance more compulsory to tackle illiteracy, and implementing oversight for teacher quality. On the other hand, conscious of the powerful resistance from the religious establishment, he simultaneously established an entirely new, secular educational stream to run alongside the traditional system (Kamer, 2020).

Mahmud II founded modern mektebs targeted to the practical needs of the state: military schools, engineering academies, and medical/surgical schools. He also created institutions for training diplomats, translators and civil servants, such as the Mekteb-i Ulum-u Edebiye and the Mekteb-i Ma'arif (Martykánová & Kocaman, 2018) (Doan, 2024). Two practices underpinned this modernising project: the sending of promising students to European centres of learning — most notably Paris and London — and the creation of an official translation bureau (Tercüme Odası) to render Western scientific and technical works into Ottoman Turkish. These moves acknowledged a hard truth: much of the expertise the state needed could no longer be sourced domestically (Kulaç & Özgür, 2017) (Doan, 2024).

Mahmud's strategy was, fundamentally, a high-stakes political balancing act. He pushed modernisation hard enough to build capacity, yet not so hard as to provoke an irreconcilable clash with centuries-old educational institutions and the ulama. The result was a pragmatic compromise: modern schools established in parallel to traditional ones. That compromise preserved short-term stability but planted the seeds of a longer-term problem — the educational dualism that would become a source of social and political tension (Permana et al, 2024).

**2. The Tanzimat era (1839–1876): codifying modern education**

The Tanzimat era represented an effort to institutionalise and broaden the reforms Mahmud II had begun. If Mahmud opened the doors, the statesmen of the Tanzimat — figures such as Mustafa Reşid Pasha and Fuad Pasha — set about building a coherent institutional framework. The era's legal charter, most notably the Hatt-ı Şerif of Gülhane

(1839) and the Hatt-ı Hümayun (1856), enshrined basic rights for all subjects and provided a legal foundation for administrative, legal and educational modernisation (Doah, 2024).

Educational administration was centralised with the formation of the Maarif-i Umumiye Nezareti (Ministry of Public Instruction), which oversaw the gradual diffusion of modern schooling from elementary (Sıbyan Mektepleri) through middling (Rüşdiye Mektepleri) to secondary levels. Secondary education diversified into preparatory lycées (İdadi Mektepleri) and elite sultanic schools (Sultani Mektepleri), culminating in flagship institutions like Galatasaray Lycée (1868), which taught in French and sought to form a cosmopolitan Ottoman elite (Kamer, 2020; Macar, 2010).

Crucially, the Tanzimat vision extended beyond technical training. Reformers pursued an ideological project of Ottomanism: to forge a civic identity that transcended religious and ethnic divides and to instil loyalty to the central state. Schools thus became instruments of social engineering — charged not just with teaching skills but with cultivating a modern, loyal subjecthood (Gürhan & Çiftçi, 2021).

Yet the reforms carried unintended consequences. By expanding modern education in minority languages and increasing literacy among non-Muslim communities, the state inadvertently sharpened distinct ethno-religious consciousnesses. In time, the very schools intended to knit the empire together helped nurture the national movements that would challenge imperial unity. In this sense, the Tanzimat's schooling project was both emancipatory and destabilising (Macar, 2010).

## 3. The emergence of educational dualism: a lasting tension between tradition and modernity

The nineteenth century's most enduring legacy was the creation of a bifurcated educational system and, with it, a divided society. By building modern, secular schools without fundamentally reforming the traditional madrasa network, Ottoman policy produced two parallel worlds of learning (Doah, 2024).

On one side stood graduates of the traditional system — jurists, judges, religious scholars and teachers — who read the world through the prism of classical Islamic learning and often regarded Western ideas with suspicion or hostility. They saw themselves as custodians of moral and cultural truth and held considerable sway over religious and legal institutions (Ulumiddin, 2016).

On the other side stood the new modernists — military officers, bureaucrats, doctors, engineers and intellectuals trained in modern sciences and foreign languages. Many of these men adopted secular lifestyles, embraced European intellectual currents, and saw comprehensive modernisation as the path to survival. They were the engines of political change: the Young Ottomans, and later the Young Turks, drew heavily on this cohort (Karagoz, 2018).

This cleavage was not merely scholastic; it was ontological. The two streams practised distinct epistemologies, used different conceptual vocabularies and proposed irreconcilable remedies for the empire's problems. The resultant contest played out across

newspapers, court politics and, ultimately, in the street. When the modernist-educated officer corps prevailed — first in 1908 and, later, in the revolutionary founding of the Turkish Republic under Mustafa Kemal — it was a decisive triumph of one educational logic over another. But it was also the culmination of a century of wrenching transformation that left a durable fault line in the region's political culture (Doah, 2024).

The nineteenth century was an era of urgent improvisation and genuine achievement. Ottoman policymakers marshalled resources, imported knowledge and built institutions under immense pressure. Yet, these reforms were deeply shaped by the crisis they sought to remedy: they were reactive, top-down, and frequently constrained by political compromises. The result was a partial modernity — one that strengthened the state in important ways but also produced tensions and contradictions that reverberated long after the empire's political structures dissolved. The next chapter will assess how these reforms fared in practice — their successes, their limits — and how they influenced the final transformations of the late imperial and early republican eras.

**The Ottoman Echo in Today's Global South**

The Ottoman lesson for the Global South is heartbreakingly simple: when a civilisation stops learning, it starts to lose everything it once could do. That sentence is not a polemic — it is the quiet verdict of institutions, from madrasas to observatories, that chose repetition over inquiry and paid with their capacity to adapt. My short history — drawn from the archive and the scholarship you've just read — shows how an empire that once balanced religious learning with mathematics, medicine and astronomy slowly strangled the habits of practical reason that sustained its power. That history matters to Muslim-majority countries and the broader Global South today because the same institutional choices, dressed in different languages, produce the same vulnerabilities.

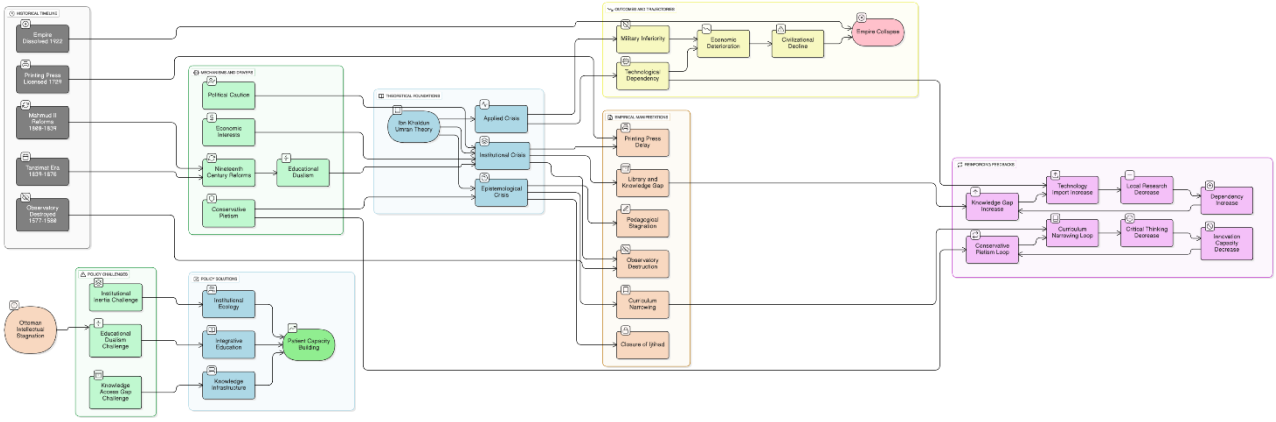


**Figure 1.** Ottoman Intellectual Crisis: Comprehensive and Policy Flow

Consider two symbolic tragedies. The first is technology deferred: movable-type printing in Ottoman Turkish only took root in Istanbul after Ibrahim Müteferrika's press was licensed in 1729 — almost three centuries after Gutenberg. The delay was not ignorance; it was a bitter compromise between religious sensitivities, vested economic interests and a

political centre unwilling to break guild power — a compromise that throttled mass access to knowledge for generations. The second is even more painful: the Istanbul observatory, a world-class scientific project founded in 1577 under Taqī al-Dīn, was destroyed within three years after court politics and doctrinal disputes turned scientific practice into a political liability. The message to scientists then was brutal and clear — some lines of inquiry would cost you your patronage, perhaps your life.

These are not dry curiosities. The Ottoman record offers crisp data on the consequences. By the late nineteenth century, the empire's public collections and printed holdings were tiny compared with European peers — a reality that limited officials' access to up-to-date knowledge, throttled research and made catch-up painfully expensive. That intellectual poverty helps explain why nineteenth-century reformers felt compelled to import entire educational systems rather than rebuild capacity from within — a pragmatic fix that created an enduring dualism between old and new schools, and between two kinds of elites.

So what should policymakers across the Global South — and especially in Islamic-majority states wrestling with madrasas, modern schools and identity politics — take from this? First: protect the institutional ecology that makes inquiry possible. Building research and scientific capacity is not a one-off procurement exercise; it is patient work across three pillars: people, infrastructure and governance. Recent policy studies underscore that investments in laboratories or scholarships must be paired with long-term governance that secures funding, tenure and freedom to fail — otherwise skills leak abroad and institutions hollow out.

Second: the politics of reform matters as much as the content. The Ottoman attempt to modernise by grafting European-style schools onto an unreformed madrasa system solved one problem and seeded another: social fragmentation and political backlash. If reformers rush to mimic models without local ownership, they risk creating parallel literacies and loyalties that fragment states rather than strengthen them. Thoughtful reform integrates religious education with critical thinking and practical sciences in ways that respect tradition but do not fetishise it. The Tanzimat era's ambition to create an "Ottoman" civic identity through schools shows both the promise and peril of schooling as social engineering; the lesson is to marry reform with legitimacy, not coercion.

Third: friends and funders should invest differently. Global partners — whether bilateral donors, universities or development banks — are often happiest paying for spectacular programmes: scholarships, short-term labs, flashy buildings. The real leverage, however, lies in patient capacity-building: doctoral programs, managerial training for research administrators, stable journal platforms, sustained translation bureaus, and protection for academic freedom. When outsiders catalyse durable local governance — matching funds, national research councils, and long-term institutional partnerships — knowledge systems can emerge that are resilient to short political cycles.

Finally, remember that access matters. The Ottoman experience with delayed printing reads like a cautionary parable for the digital age: control of platforms, norms about what may be published, and economic gatekeepers all shape who can read and who can think. Democratised access to knowledge — from public libraries to open digital repositories — is not a luxury; it is strategic infrastructure. Countries that make knowledge cheap and public will always have an advantage over those that fence it off in guilds, silos or ideological silences.

This is not nostalgia. It is a plea. The Ottoman story shows how power corrodes when curiosity does; more optimistically, it shows how deliberate choices — patronage for science, open channels for translation and, yes, courage to defend inquiry from short-term politics — can rewire a civilisation's trajectory. For governments across the Global South, the test is simple and relentless: will you build institutions whose first task is to teach people how to ask better questions? If you do, your diplomacy will be freer, your defence smarter and your economy more imaginative. If you do not, you will discover, as the Ottomans did, that armies and treaties are brittle without the sturdier foundation of a living intellectual tradition.

## Conclusion

The Ottoman Empire's demise stands as a profound civilisational lesson, one etched not merely in lost battles or treaties, but in the quiet atrophy of its intellectual spirit. This study has argued that beneath the visible political and military decay lay a foundational intellectual crisis—a multi-layered stagnation encompassing epistemology, institution, and application. Through the prism of Ibn Khaldun's *ʿumrān*, we have traced how a dynamic culture of integrated learning, which once expertly balanced the transmitted and rational sciences, devolved into a closed system of repetition and doctrinal rigidity. The symbolic destruction of the Istanbul Observatory, the deliberate delay in adopting the printing press, and the stark reality of a vast knowledge gap were not isolated failures but symptomatic of a polity that had progressively abandoned the habits of inquiry and innovation that once sustained its power. Ultimately, the empire did not collapse because it stopped fighting; it collapsed because, generations earlier, it had largely stopped thinking, learning, and adapting with the creative vigour the modern world demanded.

This historical diagnosis inevitably opens pathways for future research. A compelling avenue would be a comparative study examining the intellectual trajectories of other early modern Muslim empires, such as the Mughals and Safavids, during the same period. Such a comparison could isolate factors unique to the Ottoman context from those that were part of a broader regional dynamic, providing a more nuanced understanding of the interplay between intellectual history and imperial decline in the Islamic world. Furthermore, future studies could delve deeper into micro-histories of specific provinces or cities within the empire to explore the unevenness of this intellectual stagnation, potentially revealing pockets of resilience and innovation that were overshadowed by the central narrative of decline. Finally, investigating the biographies and networks of late Ottoman

intellectuals who attempted to bridge the traditional-modern divide could yield valuable insights into the personal and social challenges of intellectual reform, offering a human-scale perspective on this vast civilisational transformation.

**Daftar Pustaka**

Akbaş, M. (2012). The military march of physics - I: Physics and mechanical sciences in the curricula of the 19th century Ottoman military schools. *Osmanlı Bilimi Araştırmaları, 13*(2), 65–84.

Akiba, J. (2024). Farming out judicial offices in the Ottoman Empire, c. 1750–1839. *Bulletin of the School of Oriental and African Studies, 87*, 29–49. https://doi.org/10.1017/S0041977X23000940

Al-Kassimi, K. (2021). De-historicizing (mainstream) Ottoman historiography on Tanzimat and Tahdith: Jus Gentium and Pax Britannica violate Ottomanli sovereignty in Arabia. *Histories, 1*(4), 218–255. https://doi.org/10.3390/histories1040019

Atiye, A. K. (2022). *Early Arabic printing in the East*. De Gruyter. https://library.oapen.org/bitstream/id/9fff0153-fbb9-4e8b-a4e0-218aa4ffbe16/9783111060392.pdf

Bağa, E. (2021). Taqī al-Dīn al-Rāṣid and his treatise on algebra: Mathematical evaluation, translation, and editio princeps. *Nazariyat, 7*(2), 1–54. https://doi.org/10.12658/Nazariyat.7.2.M0151en

Başaran, A. (2023). Geleneksel yazma eser aktörleri ve 19. yüzyılda Osmanlı matbaası: Uzun soluklu bir dönüşüm [Traditional manuscript actors and the 19th century Ottoman press: A long-term transformation]. *Divan: Disiplinlerarası Çalışmalar Dergisi, 28*(54), 73–121. https://doi.org/10.20519/divan.1253075

Berghout, A., & Berghout, Z. (2015). The pattern of cycle of civilization: Resemblance between Ibn Khaldun and Malik Bennabi's views. *Journal of Islam in Asia, 12*(1), 228–245. https://doi.org/10.31436/jia.v12i1.468

Berkes, N. (1998). *The development of secularism in Turkey*. Hurst & Company. (Original work published 1964)

Canaklı, L. A., & Alabay, S. (2022). 'Self-learning French coursebooks' as part of French education in post Tanzimat era of the Ottoman Empire. *Journal of Education and Learning, 11*(2), 104–115. https://doi.org/10.5539/jel.v11n2p104

Çelebi, K. (2009). *Mīzān al-ḥaqq fī ikhtiyār al-aḥaqq* [The balance of truth in the choice of the most true] (A. R. Barakat, Trans. & Ed.). Dār al-Rāyah.

Çelebi, N., Asan, H. T., & Asan, E. (2018). Meşrutiyet döneminde asker–vatandaş yetiştirme anlayışı çerçevesinde paramiliter gençlik örgütleri [Paramilitary youth organizations within the framework of training citizen–militia conception in the Second Constitutional Period]. *Journal of History Culture and Art Research, 7*(2), 502–514. https://doi.org/10.7596/taksad.v7i2.1426

Çolak, Z. (2024). Pathways to modernity: Ottoman reforms before and during the Tanzimat. *Journal of Turkish World Studies, 24*(2), 417–437. https://doi.org/10.32449/egetdid.1522647

Dağlar Macar, O. (2010). Ottoman Greek education system and Greek girls' schools in Istanbul (19th and 20th centuries). *Kuram ve Uygulamada Eğitim Bilimleri, 10*(2), 805–817.

Doan, T. A. (2024). Tanzimat reforms and the Ottoman Empire's reaction to Western powers, 1839–1876. *International Journal of Social Science and Education Research Studies, 4*(6), 642–650. https://doi.org/10.55677/ijssers/V04I6Y2024-21

Elton, G. R. (2018). *The practice of history*. Routledge.

Evrensel, A. Y., & Minx, T. (2017). An institutional approach to the decline of the Ottoman Empire. *Cogent Economics & Finance, 5*(1), 1380248. https://doi.org/10.1080/23322039.2017.1380248

Gürhan, E., & Çiftçi, S. (2021). The views of educators and thinkers who influenced education policies in the Ottoman period. *Journal of Educational Issues,* (1), 138–151. https://doi.org/10.5296/jei.v7i1.18290

Hassan, D. K. (2021). The Ottoman schools and their impact on the development of the intellectual movement in the country. *Majallat al-Kitāb lil-ʻUlūm al-Insānīyah [Al-Kitab Journal for Human Sciences], 4*(6), Article 16. https://doi.org/10.32441/kjhs.4.6.16

Hassani, S. (2019). The instruments of Istanbul Observatory of Taqi al-Din. *Muslim Heritage*. https://muslimheritage.com/instruments-istanbul-observatory/

Ibn Khaldun, A. al-R. (1981). *Al-ʿibar wa-dīwān al-mubtadaʾ wa-al-khabar fī tārīkh al-ʿArab wa-al-Barbar wa-man ʿāṣarahum min dhawī al-shaʾn al-akbar* [The book of lessons, record of beginnings and events in the history of the Arabs and the Berbers] (Vols. 1–8). Dār al-Fikr.

Ibn Khaldun, A. al-R. (1981). *The Muqaddimah: An introduction to history* (F. Rosenthal, Trans.). Princeton University Press. (Original work published 1377)

Kamer, S. T. (2020). Evaluation of public education and teacher training on the basis of 1869 regulation in the Ottoman era. *Journal of History Culture and Art Research, 9*(2), 15–24. http://dx.doi.org/10.7596/taksad.v9i2.2221

Karagoz, S. (2018). Sadrettin Celal Antel's ten-year ministry development report: An assessment based on the divisions of educational sciences. *Universal Journal of Educational Research, 6*(5), 1119–1128. https://doi.org/10.13189/ujer.2018.060533

Karataşer, B. (2017). Sultan II. Abdülhamid dönemi eğitim politikası hakkında bir değerlendirme [An evaluation on education policy during the period of Sultan Abdulhamid the Second]. *The Journal of Academic Social Science Studies, 57*, 423–434. https://doi.org/10.9761/JASSS7041

Kenan, S. (2020). Kemal Beydilli, Two İbrahims: Müteferrika and his successor – Off the founders of the Ottoman printing press [Review of the book *Two İbrahims: Müteferrika and His Successor*]. *Osmanlı Araştırmaları, 56*(56), 344–346. https://doi.org/10.18589/oa.862923

Khuluq, L. (2005). Modernization of education in the late Ottoman Empire. *Al-Jāmiʻah, 43*(1), 23–55. https://doi.org/10.14421/ajis.2005.431.23-55

King, D. A. (2000). Taḳī al-Dīn. In P. J. Bearman, Th. Bianquis, C. E. Bosworth, E. van Donzel, & W. P. Heinrichs (Eds.), *Encyclopaedia of Islam* (2nd ed., Vol. 10, pp. 132–133). Brill.

King, D. A. (2024). *The Kaaba and the sacred geography of Islam: 'Faces of the Kaaba' (1982) revisited*. ResearchGate. https://www.researchgate.net/publication/385683209_The_Kaaba_and_the_Sacred_Geography_of_Islam

Kulaç, O., & Özgür, H. (2017). Sending scholarship students abroad in Ottoman Empire. *European Journal of Contemporary Education, 6*(4), 830–836. https://doi.org/10.13187/ejced.2017.4.830

Lahti, L., Marjanen, J., Roivainen, H., & Tolonen, M. (2019). *A national public library system in the making: The case of 19th-century Finland*. Journal of European Periodical Studies.

Mahmoud, D. F. (2021). Rusūm ajzāʾ al-munabbihāt al-mīkānīkīyah (ajzāʾ al-sāʿāt) ḍawʾ makhtūṭ al-kawākib al-durrīyah – fī al-bankamāt al-dawrīyah (q 10 H/16 M) [Drawings of mechanical alarm components (clock parts) in light of the manuscript Al-Kawakib Al-Durriyya – on periodical automata (10th century AH/16th century AD)]. *Journal of the Arab Union of Archaeologists, 24*, 1–24. https://doi.org/10.21608/CGUAA.2021.68500.1087

Martykánová, D., & Kocaman, M. (2018). A land of opportunities: Foreign engineers in the Ottoman Empire. In D. Martykánová & M. Kocaman (Eds.), *Foreign engineers in the Ottoman Empire* (pp. 1–18). De Gruyter. https://doi.org/10.1515/9783110492415-018

Menekşe, M. (2022). 1889-1890 yıllarında Osmanlı Devleti'nde mevcut olan rüşdiye mekteplerine dair tespit edilen bir istatistiğin incelenmesi [An investigation of a determined statistic about the Rushdiye Schools existing in the Ottoman State between 1889–1890]. *Tarih ve Gelecek Dergisi, 8*(3), 673–713. https://doi.org/10.21551/jhf.1167749

Nasirova, Y. (2024). Foreign schools in the Ottoman Empire at late 19th – early 20th centuries: On the example of Iranian schools (Based on Ottoman archival documents). *Vostok. Afro-aziatskie obshchestva: istoriia i sovremennost, 6*, 169–180. https://doi.org/10.31696/S086919080032554-6

Öktem, K. (2014). Review of *The Young Turk legacy and nation building from the Ottoman Empire to Atatürk's Turkey*, by E. J. Zürcher. *The English Historical Review, 129*(537), 483–485. https://doi.org/10.1093/ehr/ceu067

Ozçep, F. (2020). Physical Earth and its sciences in Istanbul: A journey from pre-modern (Islamic) to modern times. *History of Geo- and Space Sciences, 11*(2), 173–198. https://doi.org/10.5194/hgss-11-173-2020

Özçevik, M. U. (2021). The destruction of the Istanbul Observatory: A case study in the politics of knowledge. *Journal of Ottoman Studies, 58*, 145-168.

Permana, I. M., Putra, R. H., & Munandar, A. N. I. (2024). Political struggle for the renewal of the Ottoman Empire. *HISTORIA: Jurnal Program Studi Pendidikan Sejarah, 12*(1), 243–258. https://doi.org/10.24127/hj.v12i1.9080

Popescu, G., & Popa, A. (2022). The introduction of the printing press in the Ottoman Empire. *Journal of Early Modern History, 26*(4), 315-338.

RAND Corporation. (2001). *Science and technology collaboration: Building capacity in developing countries* (Monograph Report MR-1357.0). https://www.rand.org/pubs/monograph_reports/MR1357z0.html

RAND Corporation. (2023). Fostering innovation for national security. https://www.rand.org/pubs/perspectives/PEA2510-1.html

Rassi, S. (2021). Scribal and commentary traditions at the dawn of print: The manuscripts of the Near Eastern School of Theology as an archive of the early Nahḍa. *Philological Encounters, 6*(3–4), 402–437. https://doi.org/10.1163/24519197-bja10023

Saleh, A. A. A. (2025). Ṣirāʿ al-Dawlah al-ʿUthmānīyah maʿa al-quwá al-Ūrūbīyah (al-Namsā – Rūsiyā numūdhajan 1740-1792M) [The Ottoman Empire's conflict with European powers (Austria – Russia as a model 1740-1792 AD)]. *International Journal of Educational Sciences and Arts (IJESA), 4*(4), 1–16. https://doi.org/10.59992/IJESA.2025.v4n4p4

Sentürk, R. (2007). Intellectual dependency: Late Ottoman intellectuals between Fiqh and social science. *Die Welt des Islams, 47*(3–4), 283–318. https://doi.org/10.1163/157006007783237450

Shafir, N. (2019). Moral revolutions: The politics of piety in the Ottoman Empire reimagined. *Comparative Studies in Society and History, 61*(3), 595–623. https://doi.org/10.1017/S0010417519000185

Silverman, S. M., & Limor, E. (2021). The great comet of 1577: A Palestinian observation. *History of Geo- and Space Sciences, 12*, 111–114. https://doi.org/10.5194/hgss-12-111-2021

Şişman, A. (2009). Egyptian and Armanian schools attended by Ottoman students in Paris. *Uluslararası Sosyal Bilgiler Dergisi, 2*(1), 1–10. https://doi.org/10.12780/UUSBD37

Somel, S. A. (2001). *Modern Muslim education in Istanbul during the Tanzimat era* [Unpublished manuscript]. Sabancı University. https://research.sabanciuniv.edu/21970/1/Muslim_Education_inIstanbul_during_the_Tanzimat_Era_Somel.pdf

Tekeli, S. (2008). Taqī al-Dīn. In H. Selin (Ed.), *Encyclopaedia of the history of science, technology, and medicine in non-Western cultures* (Vol. 1, pp. 2080–2081). Springer.

Titleman, M. (2024). Mobility, change, and a shared history: The Ottoman Jewish printing press in Istanbul alongside Turkish-Muslim print. *Hamsa - Journal of Judaic and Islamic Studies, 10*. https://doi.org/10.4000/12ij5

Tosh, J. (2023). *The pursuit of history: Aims, methods and new directions in the study of history* (7th ed.). Routledge.

Turamanlar, O. (2023). Three important anatomists in the transition from the Ottoman Empire to the Turkish Republic: Hasan Mazhar, Berkol and Zeren. *Hippocrates Medical Journal, 3*(3), 34–38. https://doi.org/10.58961/hmj.1387053

Ulumiddin, A. (2016). Socio-political turbulence of the Ottoman Empire: Reconsidering Sufi and Kadizadeli hostility in 17th century. *Ulumuna: Journal of Islamic Studies, 20*(2), 319–332. https://doi.org/10.20414/ujis.v20i2.807

UNESCO Institute for Statistics. (2021). *How much does your country invest in R&D?* http://uis.unesco.org/apps/visualisations/research-and-development-spending/

World Bank. (2008). *Building science, technology, and innovation capacity in Rwanda: Developing practical solutions to practical problems*. The World Bank. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/564101468337230754/building-science-technology-and-innovation-capacity-in-rwanda-developing-practical-solutions-to-practical-problems

World Bank. (2018). *World development report 2019: The changing nature of work*. https://www.worldbank.org/en/publication/wdr2019

Zilfi, M. C. (1988). *The politics of piety: The Ottoman Ulema in the postclassical age (1600–1800)*. Bibliotheca Islamica.