

# Migration and Innovation in Early Modern Islamic Societies

## The case for Firearms

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**ABSTRACT.** *The objective of this article is to review the historiography of the relationship between migration and firearms technologies in the early modern Islamic World. By examining historiographical debates on the role of firearms in early modern Islamic societies, we will look at the place of migrants in the historical literature of firearms. During the colonial period, debates shifted from the alleged conservatism of Islamic societies regarding firearm technologies to their respective agency in the diffusion of firearms in the early modern world. In this article, I will show that the historiography of firearm technologies in Islamdom exhibits a shift from essentialist arguments towards a history looking at technology transfers and the role of migrants in this process.*

**KEY TERMS:** Islam; Firearms; Migration; Gunpowder empire; knowledge transfer; Technology.

In 1572-3, in present-day Nigeria, the Muslim army of the Borno sultanate successfully led the siege of the city of Amsaka. The sultan Idrīs b. ‘Alī (1564-1596) ordered to make platforms so that the musketeers could shoot at the enemy in the bends of the stronghold. These musketeers were led by the “Turk” officer ‘Alī Ġar, a migrant coming from North Africa. In answer to this new technology, Borno’s enemies covered their bodies with

excrement and blood as a medicine against the muskets (Ibn Furtū, Lange, 1987). These enemies actively looked for innovative measures to counter this new technology. As described in Aḥmad b. Furtū's narrative, the military innovations of the Islamic World in the early modern period (c. 1400-1800) affected States and societies that adopted firearms, but also populations who refused, or could not acquire firearms. More broadly, 'Alī Ġar's story highlights the active role migrants played in the circulation, adaptation, and innovation of firearm technologies in Islamic societies of Africa, Europe, and Asia.

The objective of this article is to review the historiography of the relationship between migration and the circulation of firearm technologies in, from, and to the Islamic World. Firearms were one of the emblematic goods that circulated across continents and global markets in an era called by some historians 'the first global age' (Gerritsen and Riello, 2014, 111). I argue that all Islamic societies, in Africa, Europe, the Middle East and Asia, were impacted by firearms, and that migrants played a key role in the circulation of the technologies related to firearms. The migration involved the movement of individuals or groups and their settlement in a given territory, whether forced or deliberate, for substantial periods of time. The circulation of these migrants, who acted as carriers of embodied knowledge, contributed to the diffusion, adaptation, and innovation of firearms in three continents. This paper takes a global approach that transcends regional specificities and consequently presents a re-evaluation of migrations in military technology change. In this article, the African continent is given particular importance, as it is often overlooked when dealing with the Islamic world.

From Greek fire to rockets, firearms are associated with many different technologies. This study will focus on weapons with a metal barrel that, using gunpowder, fired a projectile, *i.e.* cannons, bombards, muskets, rifles and pistols. The first bronze cannons were crafted in China in the 13<sup>th</sup> century (Andrade, 2016, 4).<sup>1</sup> The appearance of cannons and handguns on the battlefields of Africa, the Americas, Asia and Europe, challenged and modified numerous pre-existing technological systems (Bijker *et al.*, 1987). For example, ironworking, alloy production, furnace technologies, and chemistry were all impacted by the development of gunpowder weapons. Military organisation and tactics, hunting, as well as civilian and military architecture was also influenced by the new weapons. Gunpowder weapons caused

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<sup>1</sup> On different views, see Khan, 1991; Haw, 2013.

innovation in – amongst other things – the extraction of materials and transformation of these materials to produce firearms, ammunition, defensive or storage infrastructures, and military logistics and tactics, such as volley fire (Gille 1986, 404).<sup>2</sup>

It is widely accepted that, after its invention in China, the Mongol empire mediated the transfer of gunpowder and firearms technology to Europe (Hacker, 2015, 50). Gun technologies travelled westward, embodied in the Chinese engineers during the conquest of the Middle East and Eastern Europe (Manz, 2015, 11). Some researchers claimed that firearm technologies were used in the thirteenth century North Africa and Middle East, before reaching Europe (Allouche, 1945, 82; Al-Hassan, 2003), but this has been largely dismissed (Cook, 1994, 63; Ayalon *et al.* 1986: 1055; Hall, 1999, xvii; Gommans and Kolf, 2001, 33).

The role of Islamdom in the early diffusion of gunpowder was one of the first questions explored by modern historians. From the colonial period onwards, the question changed focus, questioning the place and agency of Islamic “gunpowder empires” in the diffusion of firearms in the early modern world, establishing a dichotomy between the Ottomans, Safavids, and Mughal empires on the one side, and the other parts of the Islamic World in Africa, and Asia. The role of migrants in the reception, adaptation, innovation, and exportation of firearm technologies in Islamdom is one of the most fruitful themes explored in recent years.

### **Islamic backwardness - The legacy of Orientalism and Colonialism**

The history of science and technology in the Islamic World faces two major challenges: the culturalist and historicist discourses. Typically, the Islamic World was associated with conservatism and backwardness (Ágoston, 2005a, 8). The role of the Islamic World in the transfer of technologies from East to West has long been diminished, although its early role in the diffusion of gunpowder and saltpetre to Europe was recognized (Reinaud and Favé, 1845, 7). This ambivalence is related to the long orientalist fashion, as well as debates surrounding colonisation, that conceived of the Islamic world in an essentialist view. To quote Roy: “in the last hundred years, racial superiority had been transformed into cultural superiority of the West Europeans”, to dismiss the agency of Muslim actors in the adaptation and innovation of firearm technologies (Roy, 2015, 114).

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<sup>2</sup> On volley fire, see Andrade *et al.*, 2014; De León, 2004; Bołdyrev and Łopatecki, 2021.

From Mauritania to India, the Islamic world almost entirely fell under direct European colonial rule in the 19<sup>th</sup> century. European imperialism shaped the historiographical representations of Africa, the Middle East, and Asia. Orientalists and colonial historians portrayed Islamic rulers as brutal conquerors, culturally reluctant to progress and innovation (Said, 1979, 59). In the sub-Saharan African case, the damages of Orientalism and colonial historiography were even greater. Any material, institutional, or intellectual sign of supposed civilisation was essentially non-African (Masonen, 2000, 492). European colonial regimes categorised race, class, and gender which constructed frameworks which defined cultural differences through a perspective of moral superiority (Stoler and Cooper, 1997, 4). Islamic societies were seen as immovable blocks that would be defined according to their relationship with the colonisers. For example, in West Africa, French administrators built their perspective of Islam on the fictional categories of *Islam maure* (Moorish, or White, Islam) and *Islam noir* (Black Islam). These binary categorizations emphasized a racialized image of Islamic societies, considered either fanatical and dangerous or submissive (Motadel, 2014, 27). In reality, Islamic reformists and neo-Sufi orders of the 18<sup>th</sup>-20<sup>th</sup> centuries aimed to adjust to the social transformations associated with technological changes, by adapting foreign technologies to the local contexts in Africa, Asia and the Middle East (Yaycioglu, 2018; Bruzzi, 2018). Despite these transformations, the idea that technological innovations, proto-industrialisation, and science were absent in the history of the Islamicate still prevailed.

This European narrative dominated, producing a teleological vision of history where the Islamic world missed a step in the process of modernisation. To explain the nineteenth-century European domination of the Islamic world, historians of the colonial period used cultural or civilisational degeneracy as a mode of historical explanation (Streusand, 2010, 6). Consequently, firearms became a Western technology, that could only but be exported to the Islamic Empires. This “first Europe, then elsewhere”, to take D. Chakrabarti’s words, was reinforced by the idea that non-European states could never, at any point, match European techniques (Chakrabarty, 2000, 7).

The early European scholarship on firearms and gunpowder in the Islamic World is part of this history. The first studies on firearms in the Arabic world were made by the Orientalists. According to Reinaud and Favé, the first firearms were believed to come from

Eastern Europe (1849, 222).<sup>3</sup> In the 1890s, the chemist Berthelot denied the role of China and the Arab world in the invention and diffusion of early cannons and gunpowder (Berthelot, 1891, 794, 808). In the early twentieth century, scholars discussed the early references to firearms in North Africa. It is in this formative period that scholars built on the idea that Islamic lands were, in the field of firearms, “following in the footsteps of Europe” (Brunschvig, 1947, vol. II, 87).

On the eve of decolonisation, one seminal work further cemented this idea of Islamic resistance to military innovation: David Ayalon’s *Gunpowder and Firearms in the Mamluk Kingdom. A Challenge to a Mediaeval Society*, was published in 1956.<sup>4</sup> It was the first monograph that dealt with the history of firearms in one specific Islamic State. According to Ayalon, psychological and cultural factors were integral to explaining the resistance of the Mamluk aristocracy towards gunpowder technologies. Stating that “European Turkey” succeeded in adopting firearms, Ayalon reinforced the orientalist dichotomy between Islamdom and the West.

According to Ayalon, firearms were “one of the main factors accelerating the domination of the Muslim East by Christian Europe” (Ayalon, 1956, xi). By associating firearms with the opposition between Islamdom and Christendom, Ayalon perpetuated the false division between a Europe, which included Ottoman Turkey, that accepted the new technologies, and an Islamic world whose elite cultural codes prevented the development of the firearms industry. Ayalon perpetuated a myth that gave cultural causal reasons to the Mamluks’ refusal to fight with firearms (Fuess, 2009, 216-219).

Despite these remarks, David Ayalon’s work was the first attempt at a social history of the impact of firearms on a Muslim society between the late medieval and early modern periods. Analysis of the integration and adaptation of technology to society is prominent in Ayalon’s work and the role of migrants is central to his argument. Both the Mamluks and the black and Maghrebi soldiers, who formed the bulk of arquebusier’s regiments after 1490, were migrants. Ayalon’s study paved the way for many historians of firearms and served as a reference in the debates on the role of Islamdom in the military revolutions of the Early Modern World.

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<sup>3</sup> See also Reinaud, 1849; Reinaud & Favé, 1850; Quatremère, 1850; Amari, 1876.

<sup>4</sup> On Ayalon’s work, see Eychenne, 2015.

## **Provincializing Europe - The study of firearms in the Islamic World**

Firearms, and their associated technologies, quickly became a much-debated symbol of the early modern socio-technological revolutions and European expansion. From Cipolla to Parker, several scholars linked the development of firearms in Europe with early modern European expansion (Cipolla, 1965; Guilmartin, 1974). By doing so, they tried to answer one of the central questions related to the ‘Great Divergence’. This attempted to understand why European technology, military and naval power, and economic growth stood out when compared to other parts of the World. On the one side, scholars such as Pomeranz downplayed the military revolution in the economic development of Europe. Other scholars underlined the impact of the European socio-political changes that followed the massive adoption of firearms in helping separate Europe from other parts of the world (Pomeranz, 2000, 199; Cullen, 2011, 20).

Hence, several scholars emphasised the importance of pre-existing technological and industrial systems to the development of firearm industries. The capacity to isolate “distinct operations that could be transferred from one craft to another” was a key factor in the development of firearm industries, in Europe, China, but also in the Islamic World (Hilaire-Pérez, 2021, 450). The pre-existing bell foundry industry, well developed in Europe and Asia, as well as watchmaking, respectively smoothed the technological transfer towards bronze cannon casting and wheel lock mechanism for guns (Cipolla, 1965, 23; Chase, 2003, 69). The lack of skilled experts and receptive industries was seen as explaining the difficulties in creating or developing gun industries (Goody, 1971, 28). This absence of manpower would be increased by the difficulties in accessing highly skilled migrants, as highlighted by Irwin in his article on the Mamluks (Irwin, 2004, 128).

The principal defender of the connection between firearm technologies and the rise of the West is Parker. Following Roberts’ idea of the revolution of European infantry, Parker’s stressing of the radical development of European fortification complemented the idea of a European military revolution (Parker, 1996; Roberts, 1956).<sup>5</sup> The Muslim world was then seen to be unable to adapt Western military technology to its pre-existing military system (Gommans, 1999, 105). Parker had a major impact, in centralising the debates on the concept of the military revolution, which reinforced the idea of a top-down pattern of arms transfers

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<sup>5</sup> For the debate surrounding the application of the term in Europe, see Clifford, 1995.

from Europe to the rest of the world, and a decline of the Islamic empires in the early modern period (Krause, 1992).

However, Parker's book has two major issues when it comes to firearm technologies in the Islamic World. First, Parker equates firearms technologies with Western technologies that non-European societies adopted by a process of mimesis involving foreign specialists. The second issue in Parker's work is the overall absence of knowledge of non-European sources and contexts. Parker often overlooks the non-European contribution to the diffusion and innovation of firearms and military tactics. This Eurocentric view, fitting within the broader teleological narrative of the rise of the West and Western exceptionalism, did not take into consideration the fact that all societies, both European and Non-European, innovated in firearm technologies. To adapt new technologies, experts had to "compromise because of a lack of locally available materials, skills, or financial resources" (Schäfer and Popplow, 2015, 329). This contributed to original attempts to innovate, as shown in introductory anecdote of Borno. Quoting Chase, even populations who did not produce firearms "helped shape how firearms were used" (Chase, 2003, 8).

After Parker's study, the much-debated concept of the military revolution and gunpowder revolution had a major influence on the Global history of firearms. Reid, in his *Warfare in African history*, labelled the long 19<sup>th</sup> century a military revolution, largely influenced by the massive diffusion of flintlock and breech-loader rifles throughout the continent, validating the idea of European primacy (Reid, 2012). Other scholars challenged Parker's hypothesis. Specialists in Asia, Africa, and the Middle East questioned the myths of Islamic traditionalism and marginalisation in the development of firearm technologies. Challenging Eurocentric conceptions of exceptional knowledge regimes (Mokyr, 1990; Landes, 1999; Greif, 2006), these scholars adapted Parker's model and took Europe as a reference point to emphasize the role of Asian empires in the military revolution.

### **From the three gunpowder empires to the Islamic World**

In 2006, Clarence-Smith called to reassess the capacity of Islamic societies to "innovate in practical ways" (Clarence-Smith, 2006).<sup>6</sup> He emphasised the role of the Ottoman, Safavid, and Mughal empires in the scientific and technological production of the early modern world. The categorisation of the Ottomans, Safavids and Mughals as the Islamic

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<sup>6</sup> See also Coşgel, 2007.

“gunpowder empires” started in 1974, with Hodgson’s *The Venture of Islam*. The three political formations rapidly became symbols of a more-or-less successful Islamic adaptation of firearms (Hodgson, 1974; Mc-Neill, 1989; Hacker, 1997). These empires shared a common history, through their adoption of firearms and gunpowder, that went beyond their different historical experiences (Streusand 2010).

Since the 1960s, the national historiographies in Turkey, the Balkans, and India, sought to highlight the role of early modern Islamic empires in the diffusion and use of firearms. They were followed by historians from the Anglo-American historiography, who studied the history of firearms in the Islamic lands from a comparative and a global perspective. In Turkey and the Balkans, scholars provided the first studies that used Ottoman and Eastern European sources to produce a history of the diffusion of firearm technologies in the Ottoman empire (Inalcık, 1954, 1975, 1980; Petrovic, 1975). In India, historians of the Aligarh Historians Society published comprehensive histories of firearm technologies in India (Khan, 1981, 1991, 1996, 1999, 2004, 2006; Habib, 2008). These scholars were essential to reassess the role of non-Europeans in the early modern history of technologies. Until today, their knowledge of non-western European languages, and of material cultures, made their works essential in showing that Islamic empires also contributed to the development of powerful gunpowder industries (Bostan, 2009; Aydıız, 2006; Yaycioglu, 2016; Gezer and Yeşil, 2018; Kaçar, 2022).

Among the historians who worked on firearm technologies, this classification has been generally accepted as a model to follow, with some deviations (Mathee, 1996; Axworthy, 2007). Scholars approached the Ottoman, Safavid and Mughal societal attitudes towards military technologies from a trans-regional perspective (Grant, 1999; Bostane *et al.*, 2000, Ágoston, 2005a, 2005b). In these studies, the emphasis was on the collaborative process that contributed to the development of firearms industries in Asia and the Middle East (Ágoston, 2014; Eaton and Wagoner, 2014). A representative example of this collaborative process, framed as technological dialogue instead of technological transfer, lies in the mutual appreciation that, on the one hand, Europeans had for Indian and Ottoman barrels, and, on the other, Indian and Ottoman had for European mechanical parts (Aksan, 2002, 264-5; Pacey, & Bray, 2021 96) In this vein, Ágoston had a decisive impact. His studies not only explored the question of the diffusion of firearms but also examined the role of migrations in technology



transfers. These migrants helped export an “Ottoman culture of technology transfer” (Şakul, 2013).

Ágoston examined organised violence as a major challenge to early modern states, their societies and their economies. In particular, he analysed how skilled migrants from Europe and the Western Mediterranean contributed, in collaboration with Turkish artisans and craftsmen, to the development of efficient gunpowder and foundry industries. On the other hand, from the 16<sup>th</sup> century onwards, Ottoman experts would travel all around the Islamic world, as deserters, adventurers, or diplomatic envoys, and contribute to the circulation of these techniques in the Indian Ocean, Central Asia and across the Sahara (Ágoston, 2019).

Following Ágoston, several scholars challenged the former assertion that Islamic states were unable to keep pace with the “West” because of their cultural and religious conservatism, fanaticism and despotism. For example, Irwin, Fuess, and Hacker criticized the myths of the Mamluk’s refusal to fight with firearms, refuting the culturalist argument developed by Ayalon (Irwin, 2004; Fuess, 2009; Hacker, 2015). The main achievements of this generation of scholars were to point out that there is no evidence that Islam inhibited the adaptation and innovations in new technology. On the contrary, there were numerous similarities between Europe and the Islamic world. Skilled craftsmen and military experts moved from one European court to another and could similarly choose to move to an Islamic land. This reassessment of South and Southeast Asia in the history of firearms technologies was recognised by Parker in a joint article with Subrahmanyam, in 2008 (Subrahmanyam and Parker, 2008).

Nevertheless, the focus on the Ottomans, the Safavids and the Mughals excluded Africa, and central and Southeast Asia. This exclusion follows a more general trend in the history of technology that tends to focus on the great empires of Eurasia and neglect other societies (Schäfer and Popplow, 2015, 310). However, the works of Cook, Casale, Lombard, and Holzwarth have shown that political rulers and socially dominant elites of other Islamic states, like Morocco, Aceh, and Bukhara, shaped the technological development of firearms. These transformations followed common patterns found in other industries. They did it through the formation and integration of foreign free and unfree labour as well as the development of new tactics. Unfortunately, the historiographies of these regions suffer from great disparities. Certain areas, such as Morocco and South-East Asia, have already been well-studied (Lombard, 1990; Cook, 1994; Casale, 2011; Maziane, 2012; El-Hamel, 2013).

Others, like Central Asia, have only recently attracted the attention of researchers (Holzwarth, 2015; Levi, 2017, 2020). Others, like the Sahara and sub-Saharan Africa, are yet to be integrated into a larger narrative on the global history of firearms. In Islamic Africa, studies mainly focus on the 19<sup>th</sup> century, and little has been done since the 1970s (Fisher and Rowland, 1971; Smaldone, 1972; Law, 1976: 122; Hacker, 2008). The Islamicate world faces a great disparity of scholarly interest in firearms technologies. Yet, the Sahara, Middle East, Central Asia, and *Saharasia* share a certain environmental unity, and some common patterns of human mobility, that could present interesting new avenues of study (Gommans, 2002, 9).

### **Migrations and firearm technologies**

The history of Islam is marked by human mobility. The demographic, political, and cultural impacts of these movements have been extensively studied in the history of early modern Empires (Farooqi, 1988; Netton, 1993; Faroqi, 1994; Dewièrè, 2017. Subrahmanyam, 2019). Islamdom shared common patterns with the rest of the world, as well as some specific phenomena, such as the Pilgrimage to Mecca, or the political theorisation of *hijra*, the migration of Prophet Muḥammad and his followers to Medina. In many Islamicate societies, foreigners had a favourable status and could access important political positions and high social status (Abu-Sahlieh, 1996). In many cases, like in Mamluk Egypt, the Borno sultanate, Mughal India, or the Arma of Timbuktu, power belonged to *foreigners*, who built their legitimacy on prestigious - real or invented - foreign genealogies (Martinez Gros, 2014). The high status a foreigner had in an Islamic society, though subject to certain conditions and exceptions, was a framework that smoothened the importation of new technologies.

Migration of experts in firearm technologies included a large framework of individual or collective trajectories, from military slavery to religious mobility. Some were sent by the rulers in embassies, while others would individually travel to sell their expertise. Some would be refugees, in a “more-or-less” voluntary movement, that shared similarities with forced migration (Fisher, 2001, 2). In regard to the transfer of firearm technologies, research mainly dealt with captured military personnel of polities that Islamic empires were fighting against; men of knowledge, diplomatic actors, or soldiers, who decided to try their luck in the Islamicate world; engineers or founders exchanged by rulers in the context of diplomatic agreements. They could already have an expertise, or learn where they settled, in the field of firearm technologies. Hence, historians generally make a distinction between forced migrations, and voluntary migrations.

The integration of slaves into the military institution, in dialogue with the nomadic component of the army, was the most distinctive feature that explains the patterns of integration, adaptation and innovation of gunpowder technologies in Islamdom (Amitai, 2006). Recent scholarship has discussed the introduction of firearms in relation to this pattern (Franz and Holzwarth, 2015). The flow of European, African, and Asian prisoners and slaves were a key contribution to the diffusion and use of firearms. From Morocco to India, their integration was facilitated by religious conversion, incorporation into communities, and military institutions of the gunpowder empires (El-Hamel, 2013; Subrahmanyam, 2019). Slaves were operational migrants, who fit into the tradition of Muslim military slavery (Rota, 2015, 238).<sup>7</sup> Hence, enslaved black Africans were trained as musketeers in the 15th-century Mamluk sultanate and 17th-century Morocco (Ayalon, 1956; Meyers, 1977; El-Hamel, 2013). In Southeast Asia, firearms were extensively diffused by the intermediary of Turkish or Chinese engineers and European renegades (Lombard, 1990, II, 10). The Safavid Shah Abbas I (1587-1629) built a slave army of musketeers and gunners (*ghulam*), recruited from captured Circassians, Armenians, and Georgians. The sultan of Bukhara copied the Safavid with his *ghulam* of Persian and Russian origin (Holzwarth, 2015, 331).

Voluntarily migrations also played a decisive role in the diffusion and adaptation of firearms. These migrations were multidirectional and complex. From Morocco to Brunei, passing by the well-known Ottoman, Safavid and Mughal empires, migrants transported embodied knowledge or were specially selected to acquire this knowledge. Migrants not only facilitated the transfer of knowledge through practice and know-how but also through the translation of books. For example, Spanish manuals of artillery were translated by the Morisco community in the Maghreb (Glick, 2009, 35). Migrants contributed to the circulation of firearms themselves. In 1518-19, the diffusion of wagon laager and foundry techniques from the Ottomans to the Mughals was facilitated by the defection of more than 2000 Ottoman deserters with their weapons (Ágoston, 2019, 92-93). Accustomed to handling firearms and resentful against the Spanish, Muslim and Jewish Andalusian refugees largely contributed to the reinforcement of Moroccan military strength and the conquest Timbuktu (Perry, 2005; Garcia-Arenal, 2009, 64; El-Hamel, 2013, 148).

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<sup>7</sup> On operational migrants, see Lucassen and Smit, 2015.

This constant migration of European and non-European experts was multidirectional and complex. As underlined by Murphey, Islamic states easily absorbed skilled migrants, favouring the technology transfers from Europe, but they also exported technologies (Murphey, 1999, 106). In 1462, Ottoman techniques of cannon casting would eventually spread up to Burgundy, through a gunner who probably served in the Balkans (Depreter, 2016; Kaçar, 2022). In the 16<sup>th</sup> century, Uighur and Turkmen migrants contributed to the introduction of the first matchlocks in China (Needham, 1986, 440-442; Ishii, 2001, 154). In Bar Sa'ad Din (Ethiopia), servants arriving from India or Yemen with muskets and cannons, taught the soldiers of the jihadist leader Imām Aḥmad how to use them against the Christian kingdom of Ethiopia (Stenhouse and Pankhurst, 2003, 122, 344; Chekroun, 2015, 176 n. 10).

Despite these examples, only a few studies focus on the role of migrants in encouraging military innovations. Little is known about the trajectories and lives of these migrants, be they individual, or groups. Several names, such as Jorg of Nuremberg, Urban, Hemu, the Hindu General of the Suri Sultanate, François baron de Tott, or Ali-Quli, reappear throughout recent analyses (Aksan, 2002; Tóth, 2003; Philippides and Hannak, 2011, 387-396; Şakul, 2011; Roy, 2015, 129-130; Ágoston, 2019, 103). However, the sources are scarce and many of these migrants are largely unknown. In many areas throughout Africa, the history of military technology transfers and the migrant's role within it remains to be fully written.

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From the 19<sup>th</sup> century to the 1960s, western historians developed the idea of Islamic backwardness and conservatism that ignored or denied the importance of Islamic empires, in the history of firearms. Gunpowder technologies were seen as a European feature, that Islamic societies only partially adapted with the help of European migrants. Islamic individuals were marginalised, as well as local know-how and internal technology transfers. Large areas of the Islamic world, such as sub-Saharan Africa and central Asia, were largely ignored in this history.

After the 1960s, the focus on the gunpowder Islamic empires allowed historians to go beyond the confines of the relationship between Islam and technology, and highlight the differences, or divergences within the Islamic world. They successfully challenged the

simplistic assumption that the Islamic world was a blocked system (Gille, 1986, 380). Historians from Turkey and India highlighted the role of non-European actors and industries, thanks to the analysis of Ottoman and Indian sources. The reassessment of the Islamic Empires into global histories of gunpowder technologies was finalised thanks to the pioneering works of, among others, Ágoston, Khan, Chase, Cook, and Holzwarth. Often utilising a comparative perspective, these historians are part of a larger historiographical trend aiming at provincializing Europe in a larger Euro-Asian area. The inclusion of neglected areas of the world, such as sub-Saharan Africa, the Horn of Africa, Central Asia and Southeast Asia, must be constantly pursued. Histories of migrants are a way to connect these regions.

Unlike other technologies and industries, firearm technologies involved a critical mass of migrants. Engineers and gun founders were only one part of it. The manipulation of firearms, and the learning of new battle tactics, were coupled with a high level of military mobility. Communities of migrants must be reassessed as complex sites of entanglement, made up of people who acted as carriers of embodied knowledge. Taking a global approach to the history of migration and innovation presents a way to focus on human actors instead of a hierarchisation of systems and regions. By doing this, the transmission and adaptations of new technologies and skills can be fully understood. Except for a few names and exceptional histories, one challenge remains, however. Being able to identify, retrace and reconstruct the trajectories and lives of individual migrants.

The historiography of firearm technologies in Islamdom shows a remarkable example of the shift from essentialist arguments, that drew hard and fast boundaries between the civilizations, to a history looking at technology transfers and the role of migrants in this process (Zarinebaf, 2011, 489). This survey offers an opportunity to connect the history of firearm technologies and mobilities with other historiographies. This will help develop the study of the relationship between firearms in social, economic, and political systems (Hughes, 1987; Riello, 2010; Dazhi and Högselius, 2015). Works, such as Macola's study on firearms in 19th century Austral Africa, showed that social actors embrace and adapt technologies according to their own needs, shaping technological innovation by attributing both predictable and unanticipated functions of specific artefacts (Macola, 2016). This approach provides historians with the tools to engage in a dialogue between technology and societies traditionally marginalised from the history of technology. Furthermore, this allows the

exploration of topics such as repairing and recycling techniques, which could have “led to as many innovations as did unique moments of ingenuity” (Schäfer and Popplow, 2015, 313).

Instead of interpreting the non-adoption of technology as a civilizational failure, future research may then question the failure or success of firearm introduction in contextualised situations. Focusing on migrants’ trajectories and their relations to their host societies would then raise insightful questions. Could a migrant with a certain skill apply it in his new homeland? How would the host society react to the migrant’s installation and activity? How political power favoured or limited the activity of migrants? Were the requirements of certain technology and the skills of a migrant in this technology compatible at a social, religious, economic, and political level? The micro-global analysis would then allow historians to analyse a global phenomenon - mainly the reception, adaptation, innovation and exportation of technologies related to firearms in the early modern world.<sup>8</sup> The wide range of technologies embedded into firearms and their users, as well as the inclusive definition of Islamdom, that goes from sub-Saharan Africa to Central Asia and South-East Asia, is an exciting challenge to the historian who wants to study the global role of Islamic societies into the reception, adaptation, and innovation of technologies.

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<sup>8</sup> On micro-global history, see Bertrand and Calafat, 2018; Ghobrial, 2019.

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