

Human capital formation in medieval Islam

Maya Shatzmiller

ABSTRACT

This paper suggests that human capital, together with the division of labour, contributed to economic growth in the Islamic Middle East, from the seventh to the eleventh centuries. Skills and knowledge were transmitted through three mediums: apprenticeship, written professional manuals, and mobility of artisans. The contextual setting of each medium was different. Early formulation of labour law in the case of apprenticeship; the rise in income and standards of living resulting in literacy of the workforce in the case of the manuals; and intensive urbanization in the case of the mobility of artisans.

KEYWORDS

Islamic Middle East, Seventh to eleventh centuries, Human capital, Apprenticeship, written professional manuals, and mobility of artisans

Introduction

In their call for contributions, the organizers of this issue urged us to address the question “what is the relevancy of pre-1500 labour history to labour history”? In the case of Medieval Islamic labour history, the answer lies in the role labour played in the economic growth which took place in the Middle East during the seventh to the eleventh centuries. While periods of economic growth in historical societies, better described as “efflorescences”,¹ are usually difficult to establish, there is evidence that one took place in the Middle East during the early medieval period. A preliminary exploration of a

¹GOLDSTONE, Jack A. “Efflorescences and economic growth in world history: Rethinking the “Rise of the West” and the Industrial Revolution”. *Journal of World History*, vol. 13, no. 2, 2002, pp. 323-389.

series of diagnostic indicators, one of them labour, makes it possible to argue that this was indeed the case.² The role of labour in improving the productivity of the Islamic economy in the eighth to the fifteenth centuries, was demonstrated through the increased division of labour and specialization, described in a study of the occupational classification in Islamic cities in the medieval period.³ During the initial growth, from the eighth to the eleventh centuries, there were 418 unique occupations in the manufacturing sector and 522 in the service sector.⁴ The highest degree of division of labour and specialization occurred in the textile, food, building and metal industries, which had the highest concentration of labour in the cities. No such extensive division of labour was shown in any contemporary economy, including Western Europe. The division of labour in the service sector occupations corresponded with the expansion in commerce, trade, and administration. In addition to this expanding division of labour, the rise in labour productivity in the medieval Islamic cities was paralleled by a rise in human capital. The purpose of this paper is to determine the existence of this human capital factor in medieval Islam by placing its formation on a solid empirical basis.

Human capital and economic growth: methodological context

Economists define human capital as “the improvement in labour created by education and knowledge embodied in the workforce”, and economic theory links human capital through technological progress directly to economic growth today.⁵ In the economic history of pre-modern Europe, human capital constitutes the origin and foundation of the rise to prosperity. Human mastering of technology and technological innovation were investigated by Joel Mokyr, who concluded that human capital played a critical role, pushing the limits of labour productivity to new heights and aiding economic growth.⁶

² SHATZMILLER, Maya. “Economic Performance and Economic Growth in the Early Islamic World”. *Journal of the Economic and Social History of the Orient*, 54(2011): 132-184. A book manuscript on the subject is currently under preparation

³ SHATZMILLER, Maya. *Labour in the Medieval Islamic World*. Leiden: E. J. Brill, 1994; Idem., “L’Organisation du travail urbain et les métiers”. In: GARCIN, Jean-Claude e BALIVET, Michel. eds. *Etats, Sociétés et Cultures du Monde Musulman Médiéval Xe-XVe siècles*, T. 2: *Sociétés et Cultures*, Nouvelle Clio, *L’histoire et ses problèmes*. Paris: Presses Universitaires de France, 2000, pp. 199-219; Idem., “Artisans. Pre-1500”. In: FLEET, Kate; KRÄMER, Gudrun; MATRINGE, Denis; NAWAS, John; ROWSON, Everett. eds. *Encyclopaedia of Islam, Third Edition*. Leiden: Brill, 2012.

⁴ SHATZMILLER. *Labour in the Medieval Islamic World. op.cit.* p.170. There are no other quantitative studies of occupational classification for medieval societies. See *Ibid.*, pp. 11-33 for references.

⁵ KRUGMAN, Paul and WELLS, Robin. *Economics*, 3rd ed. New York, Worth Publishers, 2013, p. 532.

⁶ MOKYR, Joel. *The Lever of Riches. Technological Creativity and Economic Progress*. New York and Oxford: Oxford University Press, 1990, p 3.

The mechanisms linking rising productivity to human capital formation, such as an increase in per capita income, rising living standards, more discretionary income to spend on education, also lie behind the “Smithian growth” linked to the finer division of labour, which Mokyr highlighted as one the four technology-related processes leading to growth.⁷ The other component of human capital formation was literacy and numeracy, which made possible the implementation of technological innovation. As Reis argued “the unprecedented rise in literacy” beginning in the seventeenth century was fundamental to the economic growth of Western Europe.⁸ What makes both the studies of Mokyr and Reis linking human capital and historical economic growth, methodologically solid is the statistical evidence they provide us on wages and standards of living in the prelude to the Industrial Revolution.⁹ Even if real wages in Great Britain and Holland did not rise decisively above medieval levels before 1870, the link between human capital and economic growth remains unchallenged.¹⁰ While the studies may throw the precise moment of this rise in productivity into doubt, they do not question the dynamics of the process of human capital formation, and its relevancy.

The economic growth detected in the early medieval Islamic Near East from 750-1000 AD, was not sustained over the long-term; nevertheless it was real enough to produce such diagnostic indicators of growth as literacy, skills acquisition, and technological innovation.¹¹ Most importantly, the significance of the methodology used by European economic historians to validate economic growth is now available to us.¹² We now have statistical evidence that standards of living in the medieval Middle East were substantially higher than subsistence level and higher than those in other societies for most of the medieval period.¹³

The goal of this paper is to put human capital formation in medieval Islam on a solid empirical basis by providing historical evidence from a large spectrum of Arabic sources on education, training, and the dissemination of knowledge.

⁷ *Ibid.*, p. 5

⁸ REIS, Jaime. “Economic Growth, Human Capital Formation and Consumption in Western Europe Before 1800”. In: ALLEN, R. C., BENGTSSON, T., and DRIBE, M. *Living Standards in the Past. New Perspectives on Well-Being in Asia and Europe*. Oxford: Oxford University Press, 2005, pp.195-225.

⁹ *Ibid.*, pp. 196- 200; MOKYR. *The Lever of Riches. op.cit.*, pp. 288-289.

¹⁰ ALLEN, Robert C. “The Great Divergence in European Wages and Prices from the Middle Ages to the First World War.” *Explorations in Economic History*, vol. 38, 2001, p. 430.

¹¹ SHATZMILLER. “Economic Performance and Economic Growth in the Early Islamic World”. *op.cit.*; GOLDSTONE. “Efflorescences and economic growth”. *op.cit.*

¹² PAMUK, Şevket and SHATZMILLER, Maya. “Prices, Wages and GDP per capita in the Islamic Middle East, 700-1500”. *Journal of Economic History*. Forthcoming.

¹³ As in the case of division of labour in medieval societies, there are no comparable studies on real wages and standards of living for Europe or Asia, but there are studies on Babylonian, Roman and Byzantine standards of living.

I will review three main mediums, through which skills were transmitted in the medieval Islamic period: apprenticeship, specialized manuals, and the mobility of artisans. The contextual setting of each medium, institutions and related historical conditions, will also be reviewed: How Islamic law affected apprenticeship, how the rise in income and standards of living resulted in the growth of literacy of the workforce, and how the Islamic patterns of urbanization and demographics were linked to the mobility of artisans.

An earlier publication on human capital formation in Islam should be mentioned in this context.¹⁴ Eric Chaney upholds the view that Islam as a religion was intolerant towards and incompatible with reason and science and that this caused the absence of human capital and blocked human capital formation in medieval Islam. While there is no evidence on human capital formation provided in the paper, Chaney argues for the lack of Islamic medieval human capital by relating it to the state of Islamic countries of today. He either overlooks, or discounts, opinions to the contrary from scholars who studied Islamic technology and applied sciences.¹⁵

A “guildless” universe

Craft guilds were the single most important tool of professional education in premodern Europe, and guilds of some sort are known to have existed in classical and Roman periods, so the absence of craft guilds in medieval Islam surprises economic historians. How could labour organization and especially human capital formation take place without this efficient institution? Indeed. Yet, European craft guilds did not come into existence before the 12th century with the rise of the cities in Europe. By this time, labour productivity and human capital formation in the Islamic world had been in evidence for over five hundred years, and had remarkable material achievements to their name. Furthermore, the reputation of the European craft guilds as efficient institutions was tarnished by accusations that they blocked technological innovation in the sixteenth and seventeenth centuries; something which the recent attempt to exonerate them has done nothing to change.¹⁶ Anachronistic

¹⁴ See CHANEY, Eric. “Islam and Human Capital Formation: Evidence from Premodern Muslim Science”. In: McLEARY, Rachel M. ed. *The Oxford Handbook of the Economics of Religion*. Oxford: Oxford University Press, 2011, pp.81-92.

¹⁵ AL-HASSAN, A. and HILL, D. R. Hill. *Islamic Technology. An illustrated history*. Cambridge: University Press, 1986, pp. 7-8 on the role of religion.

¹⁶ EPSTEIN, S. R. “Craft Guilds, Apprenticeship, and Technological Change in Preindustrial Europe”. *The Journal of Economic History*, vol. 58, no. 3, Sept. 1998, pp. 684-713. Sheilagh C Ogilvie argues quite convincingly in my opinion that the guilds were “unfriendly” to economic growth. “Rehabilitating the Guilds: A Reply”. *Economic History Review*, vol. 61, 2008, pp. 175–182. Idem. *Institutions and European Trade: Merchant Guilds, 1000-1800*. Cambridge: Cambridge University Press, 2011.

and Euro-centric, (how could comparison with England or Germany in the seventeenth century, be justified?) the required comparison with European craft guilds will be honoured only when relevant, useful or just inspiring.

A view of a fictitious Islamic guild dominated the historiography of medieval labour in Islam. The historical precedents, the Roman and Byzantine guilds, were mostly social organizations without a definitive economic role, and most likely did not exist in the Middle East when the Muslims arrived.¹⁷ The idea of an Islamic craft guild originated with Louis Massignon¹⁸ and Bernard Lewis¹⁹ who were inspired by a single Neo-Platonic Isma'ili text, the *Encyclopedia of the Pure Brethren*, which described a hierarchy of manual crafts, similar to the hierarchy of spheres or heavens.²⁰ The guild they analyzed was a very different institution from the late medieval European guild. It was not a mainframe, officially recognized institution of significant economic role, dominating the production of commodities by skilled trades. It was never depicted as playing a role in innovation, training, or any function related to human capital formation. Instead it was a secret association of members of the lower classes: holders of despised trades such as barbers and tanners, persecuted minorities like Jews, Christian and Persians, and heretics of all sorts. According to this theory, their premier reason for associating with each other was to redress their lowly social standing, not to regulate items, fix prices or deliver apprenticeship. Surprisingly, the entire early generation of Islamic economic historians accepted it. Scholars such as Cahen, who later recanted, Ashtor, who never reversed his position,²¹ and the Sourdels,²² Goblot,²³ Brunschvig,²⁴ Taeschner, and Makdisi, embraced the idea of this strange craft guild without doubt.

Nonetheless, within 50 years it became apparent that no one could suggest any historical facts for the existence of a craft guild; there were no documents showing its existence and no Arabic term for it. There was no information

¹⁷ On the Byzantine guilds, consult MANIATIS, George C. "The guild system in Byzantium and medieval Western Europe: a comparative analysis of organizational structures, regulatory mechanisms, and behavioral patterns". *Byzantion*, vol. 76, 2006, pp. 463-570.

¹⁸ MASSIGNON, Louis. "La Futuwwa ou pacte d'honneur artisanal entre les travailleurs Musulmans au Moyen Age". *La nouvelle Clio*, Bruxelles, 1952, pp. 171-198 and *Opera Minora*. Beirut, 1963, I, pp. 396-417, as well as his entries "Futuwwa", "Sinf" in the *EP*.

¹⁹ LEWIS, Bernard. "The Islamic Guilds". *Economic History Review*, 8, 1937, pp. 20-37.

²⁰ I have used this text for quantification in *Labour in the Medieval Islamic World. op.cit.* pp. 76-77.

²¹ ASHTOR, Eliyahu. *A social and Economic History of the Near East in the Middle Ages*. Berkeley: University of California Press, 1976, pp.190-191, 224.

²² SOURDEL, Dominique and Janine. *La civilization de l'Islam classique*. Paris: Arthaud, 1968, pp. 455, 458.

²³ GOBLOT, Henri. *Les Qanat. Une technique d'acquisition de l'eau.*, Paris: Mouton, 1979, p. 45.

²⁴ BRUNSCHVIG, Robert. *La Berbérie orientale sous les Hafsides*. Vol.2. Paris: Adrien-Maisonneuve, 1940-1947, pp. 202, 293-305.

about apprenticeship, wages, and transmission of manufacturing skills or technology, old or new. Eventually it was Goitein who dismissed it outright: "There was no such term because guilds in the strict sense of the word had not yet come into being."²⁵ An attempt to name the para-military associations, *ayyārūn*, *fiṭyān*, *ahdāth*, *akhī*, and mystical orders *tarīqas*, which only appeared in the thirteenth century, as guilds, was equally denounced. Baer concluded, "Although the young men of the *Akhī* movement (thirteen and fourteenth century) were recruited mainly among craftsmen, the association as such was non-professional..."²⁶; they thus had no economic function. Finally, Cahen laid the idea of an Islamic craft guild to rest in a paper surveying the literature as well as explaining the historical conditions as to why guilds did not appear.²⁷

Why a fictitious Islamic guild came about in the first place is not clear and what could explain the emergence and persistence of the idea of an Islamic craft guild in the Islamic historiography of labour, in spite of a complete lack of historical evidence to its existence? Certainly the importance of the European guilds in the economic history of late medieval Europe had something to do with it. The appearance of craft guilds in Middle Eastern cities after the Ottoman conquest also played a role. Massignon's troubled private and intellectual life is also sometimes evoked as being behind the esoteric, clandestine and mystical character of the institutions he described.²⁸ But in all fairness to Massignon we may acknowledge that the idea of an Islamic guild was inspired by the historical conditions surrounding labour in Europe at the time. His insistence that the Islamic craft guilds were primarily used as social support mechanisms may have been inspired by the social nature of the later Islamic guild. Moreover, socialism was on the rise in France in the beginning of the century, and questions of solidarity within the labour movement and the dignity of labour loomed large on the agenda. After all, the Roman and Byzantine guilds as well as the European ones shared these characteristics. But Massignon also spent many years in Morocco and Lebanon, and was associated with the colonial office. Both in North Africa and the Levant, but especially in the Maghreb, the bureau invested money in

²⁵ GOITEN, S. D. *A Mediterranean Society: The Jewish Communities of the Arab World as portrayed in the Documents of the Cairo Geniza*. Vol.1. Los Angeles and Berkeley, University of California Press, 1967, pp. 81-83.

²⁶ BAER, Gabriel. "Guilds in Middle Eastern History". In: COOK, Michael A. ed. *Studies in the Economic History of the Middle East. From the Rise of Islam to the Present Day*. London: Oxford University Press, 1970, pp. 11-30.

²⁷ CAHEN, Claude. "Y a-t-il eu des corporations professionnelles dans le monde musulman classique?" HOURANI, A. H. and STERN, S. eds. *The Islamic City*. Oxford: Bruno Cassirer, 1970, pp.51-63.

²⁸ GIBB, H. A. R. "Louis Massignon (1882-1962)". *Journal of the Royal Asiatic Society*, vol. 95, 1963, pp. 119-121.

recording native industries and production techniques. This gave rise to the type of “administrator cum scholar”, an entire generation of individuals including Massignon, who lived in the Muslim French colonies and wrote an entire body of literature on labour techniques.²⁹

Regardless, the persistence of the notion of Islamic guilds resulted in a lack of serious investigation into the most basic questions about how the transmission of techniques occurred, how the acquisition of skills took place or the mentoring and the formation of the young generation of craftsmen ensued. Until a more thorough study is conducted, this is what we know about the mediums of human capital formation, beginning with apprenticeship.

Apprenticeship and labour law

Apprenticing with a family member, or in an artisan shop, was the most common method of transmission of techniques. References to apprenticeship with a father come from the individuals who wrote professional manuals. One such example is that of the eleventh century Tunisian ruler Tamīm b. al-Mu‘izz b. Bādīs, who learned his bookbinding skills from his sultan father. In the fifteenth century Ibn Mājid wrote a navigation manual for skippers navigating in the Indian Ocean. He describes having studied with his father, who was a *mu‘allim*, master, a hereditary title that his father and grandfather held before him. The epitaphs in the main cemetery in the city of Akhlat, in Anatolia, show that masonry was a hereditary trade in the thirteenth and fourteenth centuries.³⁰ Some suggest that in addition to apprenticing with the father, that “Craftsmen apprenticed their nephews, generally the man's sister's son and might eventually reveal their trade secrets only to them”.³¹

Outside the family, apprenticeship took place on the artisan’s shop floor. The large enterprises, such as state workshops, had a hierarchy of employees, headed by the masters, *mu‘allims*, and followed by workers, *‘ummāls*, and apprentices, *muta‘allims*. The masters believed that the hierarchy helped them

²⁹ Named “Les trois services d'artisanat de l'Afrique du Nord” it published the *Cahiers des Arts et Techniques d'Afrique du Nord* and *Bulletin de liaison des agents du service de l'artisanat*. These civil servants were charged with supervising the native industries. Among them were Boris Maslow on the Moroccan mosque, Yves on the wool industry in Morocco, R. Le Tourneau on gold spinning in Fez, P. Ricard on bookbinding, L. Brunot on milling, tannery, and shoe making, G. Chantreaux on weaving, V. Loubignac on wax makers, H. Basset on the wool making, A. Bel and P. Ricard on wool making, and J. Herber on potters.

³⁰ ROGERS, J. M. “Calligraphy and Common Script: Epitaphs from Aswan and Akhlat”. In: SOUCEK, P. ed. *Content and Context of Visual Art in the Islamic World*. Philadelphia: Pennsylvania State University, 1988, p.113.

³¹ ZUHUR, Sherifa. "Of Milk-Mothers and Sacred Bonds: Islam, Patriarchy, and New Reproductive Technologies". *Creighton Law Review*, 25/3, 1991-92, p. 1728.

to control the process and keep technological secrets under lock and key. In the fourteenth century al-Hakīm, the Marīnid mint director of Fez, explained in his minting manual: “the consensus among the masters in our time is that they do not let a stranger into the profession with them. If they do that, it is like inviting in the deterioration of the profession and loss of money”.³² Art historians frequently comment on the diffusion of techniques in the decorating arts and their relationship to apprenticeship. A. L. Mayer thought that the hierarchy created an intellectual affinity among generations of artisans: “the master was linked to his teachers on whom he depends and his pupils in whom he instils his ideas”.³³ O. Grabar showed that one precise technique of decoration tended to predominate in each of the great monuments of the medieval Islamic world: mosaics in Damascus, stucco in the Ibn Tulūn mosque, stone and ceramics in Qairawan.³⁴ These examples from the decorating arts demonstrate how the apprenticeship system contributed and was part of the process of specialization and division of labour in the manufacturing sector. Two other groups visibly interacting in the great variety of decorative techniques, the contractors and supervisors, also took on apprentices.³⁵ There was no limit on the number of artisans who entered the trade through apprenticeship; the masters were only limited in the number of apprentices each could hire by the size of their clientele.

The state workshops, or factories, employed a large number of artisans in one spot, supervised and led by masters. They also played a role in the transmission of knowledge and skills, as well as in the increasing specialization and division of labour. Two examples of this are the royal textile workshops, the *tirāz* factories, located around the palace, and the professional schools for scribes and administrators, also located in or around the palace. Some schools for musicians may have functioned in a similar manner.³⁶ The textile workshops did not produce everyday items of clothing, but were reserved for the production of expensive and luxurious textiles, which were eventually given to dignitaries as present. There is no indication that the skills practiced in the royal workshops were kept secret. On the other hand, skilled labourers could be forced to work in the royal workshops, including the mint. Goitein found such conscription existing among the Jews

³² AL-HAKIM. *Al-Hakim, al-Dawha al-mushtabika fī dawābit dār al-sikka*. MU’NIS, H. ed. Madrid: 1960, p.57

³³ MAYER, A.L. *Islamic Woodcarvers And Their Works*. Geneva: A. Kundig, 1958, p. 13.

³⁴ GRABAR, Oleg. *The Formation of Islamic Art*. New Haven: Yale University Press, 1973, p.132

³⁵ MAYER. *Woodcarvers*. op.cit., p.12

³⁶ SERJEANT, R. B. *Islamic Textiles. Material for a history up to the Mongol Conquest*. Beirut: Librairie Du Liban, 1972.

of Fatimid Cairo and notes that although their wages may have been regular, the only way out was a personal petition to the Caliph.³⁷

In late medieval Europe, the hiring of an apprentice was regulated by a contract which determined the duration of the apprenticeship, the kind of instruction to be received, the apprentice's duties and remuneration, and signed by both the youngster's parents and the master. Admittedly, in our case, the limited data we have on the education of the apprentice does not permit an elaboration of this aspect of apprenticeship and we are not sure how it operated. However, in contrast to the situation in medieval Europe, Islamic apprenticeship was controlled and regulated by the Islamic law of wage labour and the law of guardianship. Unlike medieval Europe, the early medieval Islamic universe experienced an early and wide-ranging labour law because of its extensive urbanization and manufacturing industries.

Apprenticeship contracts models from Roman Egypt have survived on papyri, but it is doubtful whether they could be considered as models for the Muslims.³⁸ A contract written on papyri from 871 AD Egypt, details the hiring of a youngster by his father to a butcher for a year in return for his food and clothing, though there is no mention of apprenticeship, but rather of service.³⁹ The *Genizah* contains apprenticeship contracts written according to Jewish law. In a contract signed in 1027 in Fustāt, Egypt, a father hired out his son to a weaver for four months, in return for the payment of 15 dirhams a month, after which the son would receive regular workman's wages. Both father and son made legally binding stipulations.⁴⁰ Another contract confirmed that teaching a son a trade involved payment from the parents.⁴¹ The *Genizah* documents also mention women "teachers", teaching little girls the art of embroidery and other needlework. Another document described a widow who was given two orphans to teach the craft of embroidery, but no contracts were signed.⁴² Limited references to the apprentices themselves is also available in the legal responses to questions submitted to jurists, the *fatwās*. An apprentice to a tanner (*muta'allim ma'ahu lahu*) mixed a putrid skin with the clean skins, thus spoiling them. What was the status of the skins? The mufti Ibn Lubāba, (tenth century), replied that while the apprentice did

³⁷ GOITEN. *Mediterranean Society*. Vol.1. *op.cit.*, p. 82.

³⁸ Examples of apprenticeship contracts from Roman Egypt in JOHNSON, Allan Chester. "Roman Egypt to the reign of Diocletian". In: FRANK, T. *An Economic Survey of Ancient Rome*. Vol. 2. Baltimore: The Johns Hopkins Press, 1936. For shorthand, see pp. 291-2, for weavers, metal workers, flute playing, including a girl, see pp. 388-391, 286-7, 306-10.

³⁹ DAVID-WEILL, J. "Contrat de travail au pair. Papyrus Louvre 7348". *Études d'Orientalisme dédiés à la mémoire de Lévi-Provençal*. Leiden: E. J. Brill, 1962, pp. 509-515.

⁴⁰ GOITEN. *Mediterranean Society*. vol. 3. *op.cit.* p. 237.

⁴¹ *Ibid.*, vol.3. p. 218.

⁴² *Ibid.*, vol. 1. p. 128.

not enjoy the immunity given to an artisan, there was no damage; the act of dyeing the skins purified them.⁴³ By the fourteenth century, European-style apprenticeship contracts were written and used in the regions not far removed from the shores of Syria and Egypt, such as the island of Crete, but the practice never crossed over into the Islamic lands.⁴⁴

The use of apprenticeship contracts in the Islamic context was limited in comparison, and when a contract was used, it did not provide for systematic training. To the best of my knowledge no apprenticeship contracts have been found in the Islamic archives, beside the ones from the *Genizah*. Yet, notarial manuals offer model contracts, and a legal body of rules and regulations, which structured and normalized the hiring of wage labourers, including the hiring of an apprentice. The legal sources, *fiqh*, deal with hiring under several headings, the hiring of labour, *ijāra*, hiring of an object, *kirā'*, and hiring of an operation, *ju'ul*.⁴⁵ A specific section is devoted to the hiring of artisans, *istis, nā'*, dealing with hiring craftsmen, *sunna'*, to work on manufacturing or repairing specific items under their care. These artisans enjoyed immunity, *tad, mīn al-sunna'*, if any items given to them were damaged during the process. Hiring, like sale, is a purely consensual contract. The contracting parties are not required to have reached their majority in order to contract out their labour, but the period of hiring must be stated. The notarial manuals, *shurūt, uqūd, wathā'iq*, provide numerous contract templates for the notary's use; among them a few contracts for hiring. Typically, these contracts are not generic ones for wage labour, but were to be used for a defined job, such as well digging,⁴⁶ or wet-nursing, so clearly they were not related to gender, but to the nature of the task involved.⁴⁷ Only three models for apprenticeship contract from Muslim Spain are known to me; two out of the three dealt with orphans and one was provided for a mother who needed to hire out her young son.⁴⁸

Why was the use of an apprenticeship contract limited? To begin with, most hiring was done orally, without a written contract, but the reason behind the lack of apprenticeship contracts may have something to do with the legal

⁴³ AL-WANSHARISI. *Al-Mi'yār al-mu'rib wa 'l-jāmi' al-mughrib*, vol. 5 is devoted to hiring.

⁴⁴ SANTOSCHI, Elizabeth. "Contrat de travail et d'apprentissage en Crète vénitienne au XIV^e siècle d'après quelques notaires". *Revue Suisse d'histoire*, vol.19/1, 1969, pp. 33-74

⁴⁵ TYAN, E. "Idjāra", *EI². The Encyclopedia of Islam*. Leiden: Brill, 1964.

⁴⁶ IBN AL-ATTAR. *Formulario notarial Hispano-Árabe*. CHALMETA, P. and CORRIENTE, F. eds. Madrid: Academia, 1983, pp. 473-475.

⁴⁷ SHATZMILLER, Maya. *Her Day in Court. Women's Property Rights in Fifteenth-Century Granada*. Cambridge: Harvard University Press, 2007, pp.155-159.

⁴⁸ Al-Tulaytulī. *al-Muqni' fī 'lm al-shurūt*. AGUIRRE SÁDABA, F. J. ed. Madrid: Fuentes Árabe-. Hispanas, 1994, pp. 211-212.

status of the minor under guardianship. As mentioned earlier, in the Malikī apprentice contracts from Spain, two out of the three dealt with orphans, the other when there was no male guardian, which indicate that their existence is linked to the relationship between father, or mother, and son.⁴⁹ The law limited the parents' power to hire out their son or to force him to work and a father could never hire out his daughter. He had no right to force her to work, even if she had her own property and resources, and had to provide for her while she was in his charge, until she married and moved to her husband's house.⁵⁰ If she was divorced and had to return to her father's house, he was obligated to take her back, but according to the Malikī School, did not have to provide for her; she was expected to earn wages. When and whether male youngsters could be sent out to work, with or without wages, depended on the particular legal school. The capacity to earn a living, *qudra °alā 'l-kasb*, was determined by puberty, *bulūgh*; once this was attained a youngster was expected to earn a living.⁵¹ All the Islamic legal schools, except for the Malikī School, fixed the age of puberty at 15, even if the signs of puberty had not yet appeared. A youngster could be employed before reaching the age of 15, earning income which could ease his father's expenses, even if it did not provide all his needs. Again, all schools except the Malikī agree that a father could force a boy to work before puberty if he was capable of it. In the Malikī School, a pre-pubertal boy could not be forced to work, and if there were no physical signs of puberty the working age was set at 18. If he earned a living before puberty, he was expected to live on his earnings.⁵² Only the Malikī law decreed that if young men were capable of earning a living, the parents had the right to force them to work. The Hanafī authors recommended that where possible parents should continue to support their male children while they completed their studies.⁵³ When the youths reached majority, they had the right to end the contract which was signed on their behalf.

Although no apprenticeship contracts were found among the documents in the Islamic archives, we need to heed J. Schacht's observation on the nature of written evidence in Islamic law. He wrote that Islamic law diverged from current practice by denying the validity of documentary evidence, but that documents remained indispensable in practice; they were in constant use and normally accompanied every important transaction.⁵⁴ It may well be that hiring an apprentice was not considered an important transaction, or different

⁴⁹ *Ibid.*, pp. 208-212.

⁵⁰ SHATZMILLER. *Her Day in Court. op.cit.*, pp. 19-92.

⁵¹ LINANT DE BELLEFONDS, Y. *Traité de droit musulman compare*. Vol.3. Paris: Mouton & Co., 1973, pp. 129-131.

⁵² *Ibid.*, vol.3. pp. 129-131.

⁵³ *Ibid.*, vol. 3. p. 22.

⁵⁴ SCHACHT, Joseph. *Introduction to Islamic Law*. Oxford: Clarendon, 1964, p. 82.

from regular wage labour hiring. My work on the Granadan legal archives fully supports that observation: I have not found any hiring contracts of any sort there. Instead, transactions related to property, sales or estate divisions, were recorded at the court and accompanied by the signatures of the witnesses.

In conclusion, since wage labour was common in the medieval Islamic city, the hiring of wage labour, including an apprentice, must have taken place without a contract, merely on an oral agreement between employer and employee. The practical aspects were sufficiently regulated by two important provisions of the Islamic law, the law of guardianship and the law of hire. One may argue that wage labour became more efficient as a result because transaction costs were eliminated. Paying a notary to file the additional “paper work”, taking time to be present in court, paying the court fees, including those of the witnesses, saved time and money. For jobs of short duration and small, daily wages, it meant a great deal of saving and it may have decreased the cost of contract enforcement. Apprenticeship within the family resulted in cost savings: the labour of the son remained in the household and did not benefit the master. A son apprenticing with a father saved on living expenses and on physical capital, since a son had easy and free access to tools, furniture, machines, and saved on rent or purchase. He saved on paying for rights of access to technology and benefited without cost from the full disclosure of specific techniques of production or technological innovation. Society saved on the cost of social capital: the hereditary title of master, *mu'allim*, the fixed location, and transmission of techniques, all provided stability for society and smoothed intergenerational integration

The professional manual, the Islamic education system and the literacy of the workforce

It is impossible to provide here an entire list of the professional manuals written in the medieval Islamic lands. They still have to be classified, according to discipline, geographic origin, or chronology. I will offer only a glimpse of the various professional manuals here, according to their relevancy to the historical development of the Islamic education system and the literacy of the workforce, and through them to human capital formation.

For the first 150 years, up to 800AD, the accumulation and transmission of knowledge in Islamic society was done orally, with people memorizing information and reciting it, following a tradition established in Arabia. The transition from oral to written culture was a lengthy process, which primarily involved changes in the Arabic language itself, standards of living, and the

production of cheap paper. By the ninth century there is evidence that schools, classes and curricula became common features in Islamic cities.⁵⁵ Education and learning became available on a wider scale, as shown by the early appearance of teaching manuals for primary education.⁵⁶ We know that in Baghdad, courses included mathematics, logic and disputation, accounting, hunting, sports, music, astronomy, medicine, geometry, training or teaching of animals as well as farming, trading, construction, goldsmithing, sewing, dyeing, and other crafts, which al-Jāhiz, author of a ninth century manual for teachers, recommended for the lower classes only.⁵⁷ Confirmation that education was now based on textual transmission comes from two sources. One is the proliferation of teaching certificates, the *ijāzas* for different topics found in the Arabic manuscripts. The *ijāza* is the certificate of reading or auditing which is recorded on the last or first page of a text used for teaching, by which individuals who participated in the reading session, can now claim the right to teach. The certificate confers upon the recipient the right to transmit a text, teach it, or to issue legal opinions.⁵⁸ It became recognized as a supervised teaching tool and an established method in education in Medieval Islam.⁵⁹ The second source is the office of a *mustamlī*, a certified supervisor of texts transcribed through dictation. His role was to verify the execution of a copied manuscript and check for mistakes.⁶⁰ As early as the ninth century, the extraordinary rise of books and libraries also manifests the development and spread of the written word.⁶¹ Literacy was not restricted to the religious milieu or the court administrators; it also extended to some elements of the manual laborers.⁶² In Damascus, workers participated in reading and reciting sessions and tradesmen's names are listed in the records

⁵⁵ GÜNTHER, Sabastian. "Advice for Teacher: the 9th century Muslim scholars Ibn Sahnūn and al-Jāhiz on pedagogy and didactics." In: GILLIOT, CL. *Education and learning in the early Islamic World*. Ashgate: Variorum, 2012, pp.53-92.

⁵⁶ HECK, Paul. *The construction of knowledge in Islamic civilization*. Leiden: Brill, 2002.

⁵⁷ GÜNTHER, Sabastian. "Advice for Teacher..." *op.cit.*, pp. 82-83.

⁵⁸ WITKAM, Jan Just. "The Human Element between Text and Readers: The Idaza in Arabic manuscripts". In: GILLIOT. ed. *op.cit.*, p. 149.

⁵⁹ VAJDA, George. *Les certificats de lecture et de transmission dans les manuscrits arabes de la Bibliothèque Nationale de Paris*. Paris: CNRS Editions, 1956.

⁶⁰ WEISMEILER, Max. "The office of the mustamli in Arabic Scholarship,". In: GILLIOT. ed. *op.cit.*, pp. 173-210.

⁶¹ On the early libraries, see GROHMANN, Adolph. "Libraries and Bibliophiles in the Islamic East". In: *Ibid.*, pp. 307-319; ECHE, Youssef. *Les bibliothèques Arabes*. Damascus: Institut français de Damas, 1967. On the codex, see DÉROCHE, François. *Islamic Codicology. An introduction to the study of manuscripts in Arabic script*. London: al-Furqan Foundation, 2006.

⁶² Many of the individuals registered in the biographical dictionaries of scholars have tradesmen's names as a family name. COHEN Haim J. "The Economic Background and the Secular Occupations of Muslim Jurisprudents and Traditionists in the Classical Period of Islam (Until the Middle of the Eleventh Century)." *JESHO*, vol. 13, 1970, pp. 16-61.

of these sessions.⁶³ The switch to written texts corresponded to the introduction of cheap paper in the eighth century and while the education system of societies in both the Middle East and in early medieval Europe was always constrained and limited by the expense of the writing materials and the availability of vellums, papyri and stone, the arrival of paper changed all this. It allowed for a move from scroll to codex and hence to libraries and made production of books cheaper.

The first professional manuals were written by and for scribes, bureaucrats who used literary and numeracy skills in the administration of the court or other public institutions.⁶⁴ Some dealt directly with the technical aspects of acquiring literacy and numeracy skills, such as teaching, calligraphy,⁶⁵ Qur'an reading,⁶⁶ administration of justice and government policies, financial measures, and bookkeeping.⁶⁷ The manuals for Qur'an readers, *muqrīs*, specified rules for pronunciation, punctuation etc. and had a chart of all the variant readings which the reader consulted when his memory lapsed. Areas of state administration, such as tax collection and the royal mint, or of secretarial duties, such as market supervisors, *muhtasibs*, judges, *qadis*, notaries and secretaries, all had their own professional manuals. Agricultural manuals,⁶⁸ manuals on irrigation techniques, *qanat* digging, bookbinding, soap making, ink making, minting, pharmacological drugs, arms making,⁶⁹ and cooking were equally rich in technical details.⁷⁰ Applied science manuals included manuals for physicians, astronomers, mathematicians, and

⁶³ HIRSCHLER, Konrad. *The written word in the medieval Arabic lands*. Edinburgh: Edinburgh University Press, 2012, pp. 56-57.

⁶⁴ SHOELER, George. "The relationship of literacy and memory in the second /eighth century". In: MACDONALD, M.C.A. ed. *The development of Arabic as a written language*. Oxford: MBI Foundation, 2010.

⁶⁵ JAMES, David. "The Commentaries of Ibn al-Bas,īs, and Ibn al-Wah,īd on Ibn al-Bawwāb's "Ode on the Art of Calligraphy" (Rā'iyah fī 'l-khat,t,.)". In: KATHCART, K.J. and HEALEY, J.F. eds. *Back to the Sources. Biblical and Near Eastern Studies in Honour of Dermot Ryan*. Dublin: Glendale Press, 1989, pp. 164-191; GACEK, Adam. "Al-Nuwayrī's Classification of Arabic Scripts". *Manuscripts of the Middle East*, 2, 1987, pp. 126-130; SOUCEK, P. "The arts of Calligraphy". In: GARY, B. ed. *The Arts of the Book in Central Asia*. Paris, Unesco; London, Serindia, 1979, pp. 7-34; *Calligraphers & Painters: A Treatise by Qadi Ahmad*, translated by MINORSKY, V. In: *Freer Gallery of Art Occasional Papers*, vol.3, no.2. Washington, 1959. The manuals attest that as in other fields, the techniques used in the practice of calligraphy followed regional patterns.

⁶⁶ DENNY, Frederic Mathewson. "Qur'an Recitation: A Tradition of Oral Performance and Transmission". *Oral Tradition*. vol. 4, 1989, pp. 5-27.

⁶⁷ The *Lumā' al-qawānīn* written for al-Malik al-Sālih, Najam al-Dīn Ayyūb and the numerous *Kitāb al-amwāl* and *kitāb al-kharāj* written during the first three centuries.

⁶⁸ See the recent online site devoted to these manuals at, www.filāha.org.

⁶⁹ CAHEN, Cl. "Un traité d'armurerie composé pour Saladin." *Bulletin d'Etudes Orientales*, 12, 1947-48, pp. 103-163.

⁷⁰ RODINSON, M. "Recherches sur les documents arabes relatifs à la cuisine." *Revue des Etudes Islamiques*, 1949, pp. 95-165.

navigators.⁷¹ Other professionals wrote manuals for brokerage, *samāsira*, and water carrying.⁷² The last one was a didactic tool written for the illiterate in order to help the water carrier memorize his obligatory verses, but it also addressed techniques.

The scope and content of the professional manuals range widely, but they share certain characteristics. The typical author was an experienced practitioner, who had mastered the secrets of his profession and was capable of writing them down. He was frequently a supervisor, attached to the central administration, who coached others and introduced them to the trade. Writers were proud of their knowledge and expertise: many had their names eternalized among the practitioners, such as the calligraphers, who had scripts named after them.⁷³ The availability of cheap paper allowed workers to procure their own copy of their professional manual, and writers could afford to acquire several copies of other manuals with which to compare their own. A worker, if he so wished, could acquire a written copy of a manual and carry it with him to his place of work. Even the water carrier was advised to carry a copy with him if he was unable to read, so that the water and food, which the public received from his hands, would be blessed. One group of copiers specialized in copying manuals for the navigators to take with them to sea.⁷⁴ The written text became more than merely the transmitter of knowledge. The military manuals written in Mamlūk Egypt are the best examples of literacy acquisition occurring in the most unexpected places.⁷⁵

While the collection and classification of the professional manuals remains a desideratum, the significance of the phenomenon and its various historical dimensions and ramifications is significant in and of itself. Joel Mokyr made the pertinent observation that technological innovation will not occur in a society which is “malnourished, superstitious or extremely traditional”.⁷⁶ The Islamic society which oversaw the innovations in mechanical engineering, civil engineering, military technology, ships and navigation, textile, paper and leather, agriculture and food technology, mining and metallurgy, with written professional manuals in each disciplines, was, indeed, none of the above.⁷⁷

⁷¹ Ahmad Ibn Mādjid al-Nadjdī, *Kitāb al-fawā'id fī usūl al-bahr wa'l-qawā'id*, translated as *Arab Navigation in the Indian Ocean Before the Coming of the Portuguese*, by TIBBETS, G.R. Oriental Translation Fund. New Series, vol. XLII, London, 1981. First published in 1971.

⁷² MOKRI, Mohamed. “Un traité persan relatif à la corporation prolétaire des porteurs d'eau musulmans”. *Revue des Etudes Islamiques*, XLV/1, 1977, pp. 131-156.

⁷³ WIET, Gaston. “L'évolution des techniques dans le monde musulman au Moyen-Age.” *Journal of world History*, 6, 1960-61, pp. 15-44. AL-HASSAN, A. and Hill, D. R. *Islamic Technology. op.cit.*

⁷⁴ *Arab Navigation. op.cit.*, pp.5-6, 7, 17.

⁷⁵ A survey of the military manuals may be found in SHATZMILLER, Maya. “The Crusades and Islamic Warfare - A Re-Evaluation”. *Der Islam*, 69/2, 1992, pp. 247-287.

⁷⁶ MOKYR. *The Lever. op.cit.*, p. 12.

⁷⁷ AL-HASSAN and HILL. *Islamic Technology. op.cit.*

For the first three hundred years it was a society with no tight social constraints, open to diversity and tolerance, a “melting pot” of ethnicities, religions, languages, cultural traditions and political regimes. No literacy rates are available, but the evidence of the spread of education, books, libraries and professional manuals; proficiency in writing and reading presented here cannot lead to doubt. Furthermore, the existence of the manuals corroborates the assumed link between literacy and technological innovation. The development of an educational system within such diverse entities could not have been completed without the economic resurgence of the Middle East in the wake of the demographic shock of the sixth and seventh centuries. The evidence of real wages for unskilled labour in early Islamic Iraq and Egypt may now be taken as an indicator for the spread of education.⁷⁸ The rise in per capita income among the unskilled as well as the higher classes indicate that discretionary spending was available for the large segment of the society which could avail themselves of the emerging education system. It is a common observation that in most premodern societies, literacy and numeracy became more easily available with the rise of per capita income.⁷⁹ The Reis study highlighted education as an item of consumption too. Families were now able to spend on education allowing youngsters to remain in school longer and being able to provide them with the tools of literacy, books and teachers. Not everyone had access to literacy and numeracy, but there were sufficient numbers who were able to read the professional manuals and to write them. Technical innovations, knowledge, skills and manufacturing techniques were all transmitted through these written manuals.

Epstein argued that “In the absence in premodern societies of compulsory schooling and of efficient bureaucracies, the best available solution on all counts was arguably a system of training contracts enforced by specialized craft association.”⁸⁰ No argument there, but given the professional manuals, the evidence of the spreading of literacy and numeracy, and the spreading usage of technology, a guild contract was not the only efficient tool for human capital formation. One also has to take into account Ogilvie’s objections to the guild model: learning craft skills took much less time than guilds claimed, did not require formal apprenticeship, and was managed in many successful

⁷⁸ PAMUK, Şevket and SHATZMILLER, Maya. “Prices, Wages and GDP per capita in the Islamic Middle East, 700-1500”. *Journal of Economic History*. Forthcoming.

⁷⁹ On the European comparison PRAK, Maarten. “Mega-structures of the Middle Ages: the construction of religious building in Europe and Asia, c. 1000-1500” *Journal of Global History*, vol. 6, 2011, pp. 381-406; BURINGH, Eltjo. *Medieval Manuscript production in the Latin West*. Leiden: Brill, 2011.

⁸⁰ EPSTEIN, S. R. “Craft Guilds, Apprenticeship, and Technological Change in Preindustrial Europe”. *op.cit.*, p. 688

industries through non-guild institutions.⁸¹ There were large numbers of non-apprenticeship-trained workers; many apprenticeships were concluded without guilds and women's labour benefitted males disproportionately. The Islamic system of property rights, where women had direct control over their wages and where women's labour was protected by a gender blind Islamic hiring law, was equally effective in taking care of such liabilities.⁸²

Mobility, urbanization, ethnicity, trade

The mobility of the labour force across the newly Islamized territories is demonstrated in the sources, expanding and corroborating the context of the transmission of knowledge and skills. The numbers of artisans who reportedly were moved to newly built cities are staggering. The impact of artisans was felt especially in the cities, thanks to the increase and intensification of the urbanization process beginning in the seventh century onwards, including the building of new cities and enlargement, renovation and redecoration of old ones.⁸³ 100,000 workers were recruited for the building of Baghdad, 10,000 for the enlargement and refurbishment of Cordova, and 12,000 for the construction of the city al-Ja'afariyya for the Caliph al-Mutawakkil in the ninth century. The revolt in al-Rabad, the artisans' quarter of Cordoba, ended with the exile or migration of hundreds of artisans and their families to Fez, where they were responsible for increasing the local industries and providing the Andalusian manufacturing techniques. Samarra, Fustat, Mahdiya, Fez, Madinat al-Zahra, Cairo, all benefitted from the new skills and manufacturing techniques exercised by migrating artisans.

The process is also visible in the development of artistic styles. Artisans could move with ease from one region to another in response to the demand for their skills.⁸⁴ Architects were known to work far away from the place where they lived,⁸⁵ or were willing to travel distances to install the artifacts they created.⁸⁶ Al-Jāhiz even claimed that hydraulic engineers, expert agronomists and marble workers came to Baghdad in the ninth century from China. Al-Hamadānī, who wrote a manual describing mining techniques, reported that

⁸¹ OGILVIE. "Rehabilitating the Guilds: A Reply". *op.cit.*, p. 177.

⁸² *Ibid.*, pp. 175, 177. On women's labour, see SHATZMILLER. *Her Day in Court. op.cit.*, pp. 149-1175.

⁸³ BOSKER, Maarten; BURINGH, Eltjo and VAN ZANDEN, Jan Luiten. "From Baghdad to London: the dynamics of urban growth in Europe and the Arab world". *Review of Economics and Statistics* (forthcoming).

⁸⁴ SOURDEL, Dominique and Janine. *La civilization de l'Islam classique. op.cit.*, p. 398.

⁸⁵ Mayer. *Architects. op.cit.*, p.28; CRESWELL. *Muslim Architecture of Egypt. vol. 1.* New York: Hacker Art Books, 1978, pp.163 ff.

⁸⁶ MAYER. *Woodcarving. op.cit.*, p.16. The Egyptian carpenter Abu Bakr b. Yusuf made the components for *minbar* in his atelier and travelled with them to Mecca in order to put them up.

thousands of Persians brought gold and silver mining techniques to the Yemen. Rock crystal carving was perfected in Sasanid Iran, but the techniques were successfully transferred to Egypt in early Islamic times and mass production ensued.⁸⁷ The process was reversed when the migration of Muslim artisans benefitted the textile industry in Christian Spain.⁸⁸ The Mongols forced artisans from Iraq to migrate east, but many also migrated to Mamlūk Egypt after the fall of Baghdad.⁸⁹ In the eleventh century the names given by the Almoravids to quarters and city gates of Marrakesh, the newly built Moroccan capital, suggest that the leather artisans of neighbouring Aghmat had abandoned their city to settle in the new capital.⁹⁰ Paper fabrication passed from North Africa to Spain through the migration of artisans,⁹¹ and in Fatimid days, the use of wooden beams in the building of ceilings was brought to Egypt by builders from the Maghreb. The inhabitants of Sfax were able to imitate the textile fabrication techniques used in Alexandria in the *Genizah* period. All in all, the impact of artisan mobility on human capital formation was considerable and long-term. The process also affected the rural areas, bringing new technology to irrigation and cultivation. The construction of canals and villages are reported immediately after the conquest in the Middle East,⁹² while in North Africa the introduction of the underground irrigation technique known as *qanat* to Morocco is reported to have occurred after engineers were brought over from Spain under the Almoravids.⁹³ A few years later, in 1195, the Almohad Caliph al-Mansur sent 20.000 prisoners of war, mostly Christians, to work on the construction of underground irrigation canals, the *qanat*.⁹⁴

Ethnic and religious minorities also played a role in this process, creating a monopoly over the practice of specific technical skills and transmitting them within communal boundaries. In the Middle East and Spain, the Christians had a monopoly on the fabrication of polychromatic incrustation and mosaics.

⁸⁷ Literary evidence shows fabrication in Basra, and that the Fatimid treasure contained between 18.000 and 36.000 items". See ATIL, Esin. *Renaissance of Islam: Art of the Mamluks*. Washington: Smithsonian Institution Press, 1981, p.36

⁸⁸ GLICK, Thomas. *Muslim and Christian Spain in the Early Middle Ages*. Princeton: Princeton University Press, 1979, p.218.

⁸⁹ ASHTOR, Eliyahu. *A social and Economic History of the Near East in the Middle Ages*. *op.cit.* p.289

⁹⁰ DEVERDUN, Gaston. *Marrakech. Des origines à 1912*. Rabat: Éditions techniques nord-africaines, 1959, p.134

⁹¹ IDRIS, Hady. *La Berbérie orientale sous les Zirids, 10e-12e siècle*. Vol.2. Paris: Librairie d'Amérique et d'Orient, Adrien-Maisonneuve, 1962, p.637.

⁹² LAPIDUS, Ira. "Arab Settlement and Economic Development of Iraq and Iran in the Age of the Umayyad and Early Abbasid Caliphs". In: UDOVITCH, A. ed. *The Islamic Middle East, 700-1900: Studies in Economic and Social History*. Princeton: Princeton University Press, 1981, p.189.

⁹³ GOBLOT. *Les Qanat. Une technique d'acquisition de l'eau*. *op.cit.*, pp.149-155.

⁹⁴ *Ibid.*

Muslim metal work from Syria displays Christian symbols, indicating that the artisans were Christians and that such motifs were tolerated. In Fatimid and Ayyubid Egypt, Jews specialized in silk rather than cotton, as well as in dyeing, medicinal herbs, metals and glass. The *moqanīs*, engineers who practised the techniques of *Qanat* digging in Pakistani Baluchistan were all Afghans from the Ghilzais tribe, while those in Southern Morocco were the Todgha group from the oases and valleys of the Draa and the Tafilalet Atlas.⁹⁵ In eighteenth-century Cairo, Copts, Jews, Armenians and Greeks exercised a monopoly on gold and jewellery manufacturing.⁹⁶ But in the end ethnic monopolisation of skills proved inefficient and restrictive. The monopoly over the practice of specific techniques among small groups not only blocked new influences, but also led eventually to the disappearance of these techniques, either when conversions took place and members could no longer live in their previous quarters or when entire communities migrated away. Segregation of ethnic communities occurred when minority groups were forced to live together in defined quarters, not only to satisfy their religious and dietary needs, but also when they needed to function as a team for the purpose of manufacturing.⁹⁷

Servile labour was not excluded from the process of human capital formation. The Islamic notary manuals show that the price of a “skilled” slave, baker, carpenter etc. was double the price of an unskilled slave. Skilled slaves earned wages in the markets and later shared the income with their master. Literate and numerate slaves were entrusted with conducting the master’s business, and those employed in government progressed rapidly through the ranks. The military slave system, which produced the Mamlūk régime of Egypt, one of the hallmarks of Islamic history, was all about education. The young slaves imported from the Caucasus received schooling in the barracks and achieved high levels of literacy, even before beginning their military training.⁹⁸

Conclusion

I have argued here that during the eighth to the eleventh centuries, human capital, together with a finer division of labour, played a role in the economic

⁹⁵ *Ibid.*, p.46, note 6 and p. 48 respectively.

⁹⁶ RAYMOND, André. *Artisans et commerçants au Caire au XVIIIe siècle*. Vol.2. Damascus: Institut Français de Damas, 1973, p.227.

⁹⁷ MAYER. *Woodcarvers. op.cit.*, p.14 note 4. GOBLOT. *Les Qanat. Une technique d’acquisition de l’eau. op.cit.*, p. 46.

⁹⁸ AYALON, David. *L’esclavage du Mamelouk*. Jerusalem: Israeli Oriental Society, 1951.

efflorescence of the Middle East and that here, too, lays the significance of premodern labour history to labour history. I have attempted to establish the process of human capital formation on an empirical basis by drawing together the historical evidence available in the sources, and I have argued that this process was linked to higher standards of living enjoyed by a reasonable portion of the population. With rising income, parents could invest in education to enhance their children's future gains, and workers could afford to buy books as items of consumption. Education, in this case literacy and numeracy skills, could take place once discretionary income appeared in the economy. The process also permitted the development of markets for non-essential goods, such as education, books, libraries, manuscript copies etc. Not unrelated was the process of intensive urbanization which took place across various regions. With no restriction on the movement of skilled labour, the mobility of artisans and the resulting distribution of skills also increased. Many aspects of the broader background, such as the increase in agrarian output, rise in per capita income, increased urbanization and the manufacturing of cheap paper, which played a crucial role in the process, have to be relegated to future publications. Other topics waiting for further research and exploration could not be treated here either, including the vexing question of child labour in Islam and its relationship to apprenticeship, costs of literacy and child labour in labour markets and the opportunity costs associated with it.

This is only a preview of a much larger subject, but it is nonetheless one which champions the claim that the lack of a guild-like institutional model in medieval Islam was not detrimental to the process of human capital formation. Human capital was a significant and congruent component both in the context of the economic conditions of the Middle East and in the larger framework of the economic history literature.

