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Networking Know-How: A critical literature review of artisanal knowledge in Early Modern European cities

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Abstract

Economic historians have acknowledged the importance of the accumulation of craft knowledge and the incremental innovations that it helped to induce in turning Europe from a technological backwater in the thirteenth century to the most technologically advanced part of the world by 1750. Yet though artisanal manufacturing was largely an urban phenomenon in the early modern period, there has not been extensive historiographical focus specifically on how different urban dynamics shaped the production and circulation of craft knowledge. Additionally, those that do explore artisanal knowledge within the urban context often do so through the lens of agglomeration theory which presents a highly generalised understanding of the impact of cities. This critical review brings together the literatures from urban history and the history of science and technology with the intention of developing a more nuanced understanding that emphasises idiosyncrasy and heterogeneity rather than generality in the ways that European cities shaped artisanal knowledge.

Introduction

Fusing economic history with the history of science and technology, artisanal knowledge has become an important element in our understanding of European economic development. Progressing from a technological backwater in the thirteenth century to the most technologically superior part of the world by 1750, historians such as Joel Mokyr paint a human capital-based story in which steady accumulation of craft knowledge incrementally induced technological innovation.¹ Artisanal knowledge has also been framed as key within technological development by being linked to the scientific revolution, with scholars such as Pamela Smith undermining the notion of a strong boundary between ‘scientific’ knowledge and ‘craft’ knowledge.² Equally focused on

¹ Joel Mokyr, *The Lever of Riches* (New York and Oxford: Oxford University Press, 1990).

² Pamela Smith, *The Body of the Artisan: Art and Experience in the Scientific Revolution* (Chicago; London: University of Chicago Press, 2012).

artisanal knowledge though pivoting away from Mokyr's eurocentrism, Hilaire-Pérez and Verna explore how tacit artisanal knowledge diffused throughout the continent.³ Rather than a linear path of dissemination, they emphasise the locality of knowledge, with different techniques appropriated, imitated, and adapted based on local circumstances, reshaping it as it moved.

Linking to this focus on the spatial side of knowledge, the early modern city has been a consideration within the literature in the context of European technological development. This historiography has had a dual focus in this regard.⁴ The more prominent strand emphasises the role of cities as hubs of intellectual and 'scientific' ferment, one such example being the work of Peter Burke who explores certain urban institutions such as universities, academies, and learned societies.⁵ Alternatively, some have taken a more bottom-up approach to the relationship between cities and knowledge by considering the role of craft knowledge, particularly since artisanal manufacture was largely an urban phenomenon in this period.⁶ By examining specifically how urban dynamics influenced how craft knowledge was formulated and circulated, this literature enhances our understanding of the role of artisanal knowledge within European technological development.

This critical review assesses this lesser explored strand of the scholarship in which urban history overlaps with the history of artisanal knowledge. However, it does so whilst specifically advocating a recentring of the literature upon Hilaire-Pérez and Verna's emphasis on the locality of knowledge.⁷ More closely focused on theory, the first section outlines how a broad segment of the

³ Liliane Hilaire-Pérez and Catherine Verna, "Dissemination of Technical Knowledge in the Middle Ages and the Early Modern Era: New Approaches and Methodological Issues," *Technology and culture* 47, no. 3 (2006): 536-565.

⁴ Bert De Munck and Antonella Romano, "An Introduction," in *Knowledge and the Early Modern City: A History of Entanglements*, ed. by Bert De Munck and Antonella Romano (London: Routledge, 2019), 1-30, p. 1-2.

⁵ Peter Burke, *Social History of Knowledge: From Gutenberg to Diderot* (Cambridge: Polity, 2000).

⁶ Bert De Munck and Hugo Soly, "Learning on the Shop Floor in Historical Perspective," in *Learning on the Shop Floor: Historical Perspectives on Apprenticeship*, ed. by Bert De Munck, Steven L. Kaplan, and Hugo Soly (New York: Berghahn Books, 2007), 3-32.

⁷ Hilaire-Pérez and Verna, "Dissemination of Technical Knowledge".

scholarship linking craft knowledge and the city does so within the context of agglomeration economies. Though a highly valuable approach, applying agglomeration theory can have an overly generalising effect. Seen as heterogenous networks constituted from variegated mixtures of actors in constant interaction with one another, different European cities mediated artisanal knowledge in specific, idiosyncratic ways. Building from this criticism, the following two sections examine how the literature has incorporated this focus on urban specificity by taking two broad themes, urban institutions and market dynamics, that foster a more holistic framing of cities. Overall, this review thus advocates a refinement of how historians conceptualise the role of artisanal knowledge within European technological development.

Knowledge and Agglomeration Theory

An influential way in which historians have comprehended the impact of the urban upon the dissemination and formulation of artisanal knowledge is via agglomeration theory. Stemming from urban economics, it emphasises ways in which proximity, and by extension cities, shaped knowledge within different industries. Though highly valuable, some more recently have suggested that agglomeration theory presents an generalising perspective and that a more complex and nuanced understanding of cities and the differences between them is required to understand how they impacted upon craft knowledge.

Initially outlined by Alfred Marshall, the concept of agglomeration externalities describes how, as individuals and firms within an industry cluster spatially, economic benefits are experienced generally.⁸ Proximity is suggested as being beneficial in several ways, but pertinently it facilitates both skilled labour market pooling and ‘knowledge spillovers’.⁹ Labour market pooling refers to the accumulation of workers with specialized skills in one area, benefitting

⁸ Alfred Marshall, *Principles of Economics*, 8th ed. (Basingstoke; New York: Palgrave Macmillan, 2013), p. 222-32.

⁹ Marshall, *Principles of Economics*, p. 222-32.

employees due to the range of work available and employers due to the greater ready availability of talent. Relatedly, knowledge spillovers refer to the fluid dissemination of knowledge and skills amongst a group of workers that is co-located, for instance through labour mobility and informal networks.¹⁰ Theoretically, these ideas are key to understanding the relationship between cities and knowledge since within such an ‘industrial district’ knowledge circulates rapidly and the formulation of new knowledge via innovation is more likely due to the broad stock of extant localised knowledge but also because clustering allows for greater within-industry specialization. Jane Jacobs broadened these ideas, noting that the density of urban areas also fosters inter-industry knowledge spillovers.¹¹ Straying from Marshall’s linking of specialisation and knowledge, Jacobs emphasises that diversity of interactions between a heterogenous selection of firms and industries is also important in stimulating creativity and innovation.¹² These ideas surrounding proximity are particularly important to consider when exploring early modern artisanal knowledge since it was often tacit in nature. Mokyr and others have noted that a large amount of the specialist knowledge possessed by artisans was not easily transmitted via codification, with personal contact required to facilitate observation, memorization, and imitation.¹³ Some skills were codified, though particularly in the formative years of artisanal training, knowledge was mostly embodied and acquired by developing an intuitive understanding of physical processes and raw materials.¹⁴ Agglomeration theory therefore is an important consideration in understanding connections between artisanal knowledge and the urban.

Accordingly, these ideas permeate the literature that links early modern cities and artisanal knowledge. In his interesting discussion on the transfer of

¹⁰ Marshall, *Principles of Economics*, p. 222-32.

¹¹ Jane Jacobs, *The Economy of Cities* (London: Cape, 1970).

¹² Jacobs, *The Economy of Cities*.

¹³ Joel Mokyr, “The Economics of Apprenticeships,” in *Apprenticeship in Early Modern Europe*, ed. by Maarten Prak and Patrick Wallis (Cambridge: Cambridge University Press, 2019), 20-44, p. 21.

¹⁴ Bert De Munck, “Artisans as Knowledge Workers: Craft and Creativity in a Long-Term Perspective,” *Geoforum* 99 (2019): 227-237, p. 229.

technical knowledge and innovation in medieval and early modern Europe, Epstein connects greater levels of urbanization with localised technological superiority.¹⁵ Noting the most plausible reasons for this correlation, he cites ‘standard Marshallian ones: economically successful towns attract skilled workers, whose pooling stimulates the growth of specialised intermediate goods industries; knowledge spillovers among firms increase’.¹⁶ Epstein places a particularly strong emphasis on labour market pooling. Building on the idea established above that tacit knowledge was central within general premodern technical knowledge transfer, his key focus is on the mobility of people.¹⁷ Thus, acknowledging high contemporary transport costs, the proximity presented by cities is heralded as the key to artisanal knowledge transfer and innovation, with urban areas becoming beacons of specialized knowledge.¹⁸ Like Epstein, David’s in his analysis of Dutch technological leadership highlights the importance of immigration to cities, with initial commercial leadership, as demonstrated by high urbanization rates, attracting artisanal knowledge that promoted technological innovation.¹⁹ Becoming a preeminent entrepot during the second half of the sixteenth century, Northern cities were able to attract skilled labour in a variety of industries such as textile manufacture and shipbuilding.²⁰ These initial migrations were then heavily supplemented by influxes of immigrating refugees, such as those from Flanders and Brabant and later Protestant Huguenots and Sephardi Jews, who further contributed to broadening the epistemic base within cities.²¹ In a discussion on economies of agglomeration in Antwerp’s ‘golden age’, Limberger also emphasises the importance of labour market pooling in the city’s economic development.²² He notes how many highly

¹⁵ Stephan Epstein, “Transferring Technical Knowledge and Innovating in Europe, c.1200-c.1800,” in *Technology, Skills and the Pre-Modern Economy in the East and the West*, ed. by Maarten Prak and Jan Luiten van Zanden (Turnout: Brill, 2013), 25-67.

¹⁶ Epstein, “Transferring Technical Knowledge,” p. 63.

¹⁷ Epstein, “Transferring Technical Knowledge”.

¹⁸ Epstein, “Transferring Technical Knowledge”.

¹⁹ Karel Davids, *The Rise and Decline of Dutch Technological Leadership: Technology, Economy and Culture in the Netherlands, 1350-1800* (Leiden; Boston: Brill, 2008).

²⁰ Davids, *Dutch Technological Leadership*, p. 203-66.

²¹ Davids, *Dutch Technological Leadership*, p. 205-06.

²² Michael Limberger, “‘No Town in the World Provides More Advantages’: Economies of Agglomeration and the Golden Age of Antwerp,” in *Urban Achievement in Early Modern Europe*:

skilled artisans emigrated to Antwerp in the sixteenth century such as Italian silk-weavers, mirror-makers, and glassblowers.²³ Like Davids, the emphasis here is placed on the initial commercial success of the city attracting new knowledge and thus the capacity for innovation. Marshall's notion of labour market pooling has thus been utilized in understanding the relationship between early modern cities and artisanal knowledge.

Historians have also explored how knowledge spillovers within cities shaped the circulation of artisanal knowledge. Often under assessment are cities that resemble Marshallian industrial districts in that they became specialised in specific industries. Rasterhoff notes how knowledge spillovers are particularly difficult to measure for early modern historians due to the lack of any systematic records of innovation.²⁴ Often uncodified and transmitted informally, historians are required to take a highly qualitative approach to technical knowledge. Selecting an industrial cluster, they trace the movement of knowledge through its more tangible outcomes such as the products it was used to produce so as to pinpoint diffusion or reappropriation of innovations. Analysing the Venetian glassmaking industry, Trivelatto specifically evokes Marshall's notion of 'industrial atmosphere' to refer to the less tangible externalities of proximity, notably knowledge spillovers.²⁵ She cites the clustering of furnaces along one street in Murano for instance, between which technical knowledge circulated fluidly, largely precluding the capacity of individuals to harbour secrets.²⁶ Maitte frames Venetian manufacturing in a more Jacobian manner in which

Golden Ages in Antwerp, Amsterdam, and London, ed. by Patrick O'Brien (Cambridge: Cambridge University Press, 2001), 39-63.

²³ Limberger, "No Town in the World," p. 59.

²⁴ Claartje Rasterhoff, 'The Spatial Side of Innovation: the Local Organization of Cultural Production in the Dutch Republic, 1580–1800,' in *Innovation and Creativity in Late Medieval and Early Modern European Cities*, ed. by Karel Davids and Bert De Munck (Farnham: Ashgate, 2014), 161-87, p. 170.

²⁵ Francesca Trivelatto, "Guilds, Technology and Economic Change in Early Modern Venice," in *Guilds, Innovation, and the European Economy, 1400-1800*, ed. by Stephan Epstein and Maarten Prak (Cambridge: Cambridge University Press, 2008), 143-72, p. 221.

²⁶ Trivelatto, "Guilds", p. 224-25.

innovations spread across different sectors.²⁷ The famous *façon-de-Venise* mirrors, innovative in that the polishing of sheet glass after firing was introduced, was developed by analogy with polishing metal, demonstrating the importance of knowledge being disseminated across separate urban industries to stimulate innovation.²⁸ Regarding Bologna's silk throwing industry, Epstein notes how a competitive leadership was able to be maintained for two centuries partly due to the fluid diffusion of innovations due both to the constant circulation of labour as well as to tightly knit informal ties which sustained collaboration between firms.²⁹ Though difficult to track, knowledge spillovers within early modern cities have thus featured prominently within the literature.

While evidently valuable, these discussions of artisanal knowledge within the context of agglomeration can present a generalised image with little attention paid to the nuances of each urban context. Indeed, Van Damme and De Munck frame these discussions as being part of a broader scholarly narrative of the 'creative city' that posits the proximity of urban spaces as invariably inducing a path-dependent process whereby urbanization is linearly tied to innovation and economic growth.³⁰ Through this reductionist narrative, they suggest, the city has become a 'black box' with analysis of the specific, idiosyncratic urban dynamics shaping knowledge dissemination and accumulation foregone in favour of a naturalised image of hotbeds of innovation and creativity.³¹ The broader focus amongst historians of science and technology on knowledge being distinctively localised can remedy this generalised narrative. Hilaire-Pérez and Verna insist that whilst transfer of technical knowledge may have taken place across great distances, the microhistorical scale is the appropriate one for

²⁷ Corine Maitte, "The Cities of Glass: Privileges and Innovations in Early Modern Europe," in *Innovation and Creativity in Late Medieval and Early Modern European Cities*, ed. by Karel Davids and Bert De Munck (Farnham: Ashgate, 2014), 35-53.

²⁸ Maitte, "Cities of Glass," p. 39.

²⁹ Stephen Epstein, "Craft Guilds, Apprenticeship, and Technological Change in Pre-industrial Europe," *Journal of Economic History* 58.3 (1998): 684-713, p. 701-02.

³⁰ Ilja Van Damme and Bert De Munck, "Cities of a Lesser God: Opening the Black Box of Creative Cities and Their Agency," In *Cities and Creativity from the Renaissance to the Present*, ed. by Ilja Van Damme, Bert De Munck and Andrew Miles (New York: Routledge, 2017), 3-22.

³¹ Van Damme and Munck, "Cities of a lesser God," p. 4-5.

study.³² The varying needs and constraints of different communities meant that knowledge and techniques, rather than being universal, were employed as answers to specific local circumstances.³³ By emphasising heterogeneity and local contingency, this approach encourages the historian to ‘open’ the black box of the city and to reject generalised understandings of the link between knowledge and the urban. Cities are interesting not because they were the same but because they were different.

Aligning with this approach, De Munck suggests utilizing the lens of Actor-Network Theory to gain a better understanding of knowledge dynamics within cities.³⁴ Embodying ideas prevalent amongst historians of science and technology, urban spaces are viewed as assemblages of heterogenous actants which constantly interact and influence each other in diverse ways.³⁵ Being fluid in nature, knowledge is particularly amenable to ANT since it emphasises how knowledge does not emanate from one single mind or institution but from a broader network or milieu within which it is formulated, disseminated, and stabilised.³⁶ ANT also highlights the importance of both human and non-human actors, a beneficial approach when considering that knowledge can be embodied by both; it is mediated by individuals and institutions as they interact but also by objects, such as books, as they circulate.³⁷ In their work on knowledge and the early modern city, Romano and De Munck have championed this framing of cities, emphasising that no one specific urban actor or institution can be isolated as a factor but must be observed in interaction with others.³⁸ Knowledge does not emanate from a specific group of ‘predictable doers’ but from a variety of different configurations and hierarchies which are place-bound.³⁹ In an edited

³² Hilaire-Pérez and Verna, “Dissemination of Technical Knowledge”.

³³ Hilaire-Pérez and Verna, “Dissemination of Technical Knowledge,” p. 537.

³⁴ Bert De Munck, “Re-assembling Actor-Network Theory and Urban History,” *Urban History* 44, no. 1 (2017): 111-122.

³⁵ De Munck, “Re-assembling Actor-Network Theory”.

³⁶ De Munck, “Re-assembling Actor-Network Theory”.

³⁷ De Munck, “Re-assembling Actor-Network Theory,” p. 117-18.

³⁸ Bert De Munck and Antonella Romano, “An Introduction,” in *Knowledge and the Early Modern City: A History of Entanglements*, ed. by Bert De Munck and Antonella Romano (London: Routledge, 2019), 1-30, p. 18-19.

³⁹ De Munck and Antonella Romano, “An Introduction,” p. 18.

volume on the mobility of artisanal knowledge in Europe, Garrioch acknowledges how these heterogenous networks shaped knowledge in different ways.⁴⁰ Urban markets varied in their acceptance of new products and ideas based on local social, economic, or cultural circumstances, for example, and urban institutions such as guilds or city governments held the capacity both to help and to hinder innovation.⁴¹ Approaching cities as dynamic, idiosyncratic networks, we can gain a better understanding of the variegated ways in which they shaped artisanal knowledge.

In sum, the literature linking artisanal knowledge and early modern cities has placed significant emphasis on the role of agglomeration dynamics in catalysing knowledge transfer and innovation. Whilst highly valuable, this work creates a generalised narrative of early modern cities as invariable hotbeds of innovation and creativity, inexorably producing the modern European knowledge society. The following two sections of this review thus seek to synthesise the literatures on cities and artisanal knowledge to frame urban environments as idiosyncratic, localised networks which, though sharing common features, disseminated and developed knowledge in variegated ways. To do so, it will look at two broad themes: first, urban institutional networks; second, the relationship between market forces, cities, and artisanal knowledge.

Urban Institutions

Urban institutions represent a key strand of the literature that unites cities and artisanal knowledge. Through training and skilling, regulation and standardization, institutional arrangements shaped knowledge in crucial ways. The literature on urban institutions and artisanal knowledge has been dominated by discussion of craft guilds. Though a highly important focus, other historiographical contributions have sought to move beyond the guilds, analysing

⁴⁰ David Garrioch, "Introduction: Artisan Mobility and Innovation in Pre-industrial Europe," in *Republic of Skill: Artisan Mobility, Innovation, and the Circulation of Knowledge in Premodern Europe*, ed. by David Garrioch (Leiden; Boston: Brill, 2022), 1-35.

⁴¹ Garrioch, "Introduction: Artisan Mobility".

a wider array of institutional dynamics and thereby expanding our understanding of the complex ways in which urban institutions mediated craft knowledge.

A vast amount of the literature linking urban institutions and artisanal knowledge has focused upon guilds. Indeed, manufacturing guilds are an important element of this topic in that they were distinctively urban, existing predominantly, though not exclusively, within cities. As Mokyr outlines, this was partly since the tacit knowledge imparted within apprenticeships, as well as the systems of monitoring implemented to ensure product quality, both required proximity.⁴² The extensive guild literature has largely centred around the effectiveness of these institutions in disseminating knowledge and encouraging innovation. Presenting a critical view, Ogilvie's work on guilds in early modern Germany and more broadly suggests various incapacities in both their transmission of knowledge and their impetus for innovation.⁴³ For instance, she highlights the exclusivism of guilds which restricted entry to foreigners and largely excluded women altogether, thereby limiting the extent to which knowledge could be disseminated within a city.⁴⁴ Additionally, Ogilvie cites guilds as being opposed to technological innovation since it could put pressure on their rents with an increase in marginal output potentially flooding the market, lowering prices, and putting guilds master's out of work.⁴⁵ They lobbied against new devices and products, blocked imports that embodied novel knowledge, and by stipulating production processes, methods became ossified, deterring innovation. On the contrary, Epstein has argued that manufacturing guilds represented a conducive environment for the gradual accumulation of embodied knowledge within cities and the incremental innovation typical of most

⁴² Joel Mokyr, "The Economics of Apprenticeships," in *Apprenticeship in Early Modern Europe*, ed. by Maarten Prak and Patrick Wallis (Cambridge: Cambridge University Press, 2019), 20-44, p. 21.

⁴³ Sheilagh Ogilvie, *The European Guilds: An Economic Analysis* (Princeton; Oxford: Princeton University Press, 2019).

⁴⁴ Sheilagh Ogilvie, "The Economics of Guilds," *Journal of Economic Perspectives* 28, no. 4 (2014): 169-92, p. 182-83.

⁴⁵ Ogilvie, "The Economics of Guilds," p. 183-86.

preindustrial development.⁴⁶ Apprenticeship and the enforcement of rules against free-riding and exploitation reproduced the skilled labour force and ensured intergenerational knowledge transfer.⁴⁷ Additionally, the institutional support supplied by guilds to migrant apprentices and journeymen was crucial for mobilising knowledge which could be newly incorporated into recipient cities.⁴⁸ Building on this, De La Croix et al. place the discussion of guilds within the context of the Great Divergence debate, suggesting that the creation and dissemination of productive knowledge fostered by European guilds, and particularly by the practice of journeymanhood, help explain the European advantage over Asia where a clan-based system of tacit knowledge transfer existed.⁴⁹ Many examples of the literature mediate between these opposing views, one such example being Belfanti's discussion on how the extent to which Italian guilds represented obstacles to the introduction of innovations varied both spatially and temporally.⁵⁰ For Belfanti, 'guilds were certainly not those bastions of blinkered conservatism [...] but neither were they institutions dedicated to the promotion and diffusion of innovation'.⁵¹ As both gatekeepers and catalysts therefore, urban manufacturing guilds have been extensively explored within the literature linking artisanal knowledge and the early modern city.

Looking at urban institutions beyond the guilds, historians have explored the role of city governments in mediating artisanal knowledge. Linking to Epstein's argument of inter-urban migration as having been essential to the accumulation of knowledge, various scholars have emphasised the roles played by urban

⁴⁶ Stephan Epstein, "Craft Guilds, Apprenticeship, and Technological Change in Pre-industrial Europe," *Journal of Economic History* 58, no. 3 (1998): 684-713.

⁴⁷ Stephan Epstein, "Property Rights to Technical Knowledge in Premodern Europe, 1300–1800," *American Economic Review* 94, no. 2 (2004): 382-387, p. 386.

⁴⁸ Stephan Epstein, "Transferring Technical Knowledge".

⁴⁹ David De La Croix, Matthias Doepke, and Joel Mokyr, "Clans, Guilds, and Markets: Apprenticeship Institutions and Growth in the Preindustrial Economy," *The Quarterly Journal of Economics* 133, no. 1 (2018): 1-70.

⁵⁰ Carlo Belfanti, "Guilds, Patents, and the Circulation of Technical Knowledge: Northern Italy During the Early Modern Age," *Technology and Culture* 45, no. 3 (2004): 569-589.

⁵¹ Belfanti, "Guilds, Patents," p. 576.

governments in shaping immigration.⁵² Citizenship was one method by which labour migration could be regulated, with Davids and De Munck noting how urban authorities in the West of the Dutch Republic sought to secure a steady inflow of skilled labour by ensuring that barriers to entry for citizenship remained low.⁵³ This was a particularly attractive offer within Dutch cities where burghership was compulsory for master artisans to operate.⁵⁴ The application of citizenship as a means of attracting foreigners however depended on a range of social and economic factors specific to each city. In Eastern cities of the Dutch Republic for instance, urban governments instituted much higher barriers to foreigners, Catholics, and Jews.⁵⁵ In 1655 in Utrecht, where citizenship was a precondition to guild admission, the government refused citizenship to Catholic migrants and revoked the citizenship of those Catholics that had become burghers after receiving their citizenship rights.⁵⁶ This heterogeneity reveals that citizenship was not always used as a means of attracting new artisanal knowledge. Discussing the relevance of the granting of citizenship to technological leadership, De Meester provides an interesting example from sixteenth century Antwerp.⁵⁷ Analysing the burgher books, he notes that free citizenship was often granted to artisans who were not the most highly skilled or inventive, with the Antwerp government more concerned with building up surplus labour within the city.⁵⁸ These works together suggest that, though citizenship could be used by urban governments as a means of attracting knowledgeable artisans, its capacity to do so was often affected by the conflicting voices and priorities that varied between cities.

⁵² Stephan Epstein, "Transferring Technical Knowledge".

⁵³ Bert De Munck and Karel Davids, "Beyond Exclusivism: Entrance Fees for Guilds in the Early Modern Low Countries, c. 1450–1800," in *Innovation and Creativity in Late Medieval and Early Modern European Cities*, ed. by Karel Davids and Bert De Munck (Farnham: Ashgate, 2014), 189-224.

⁵⁴ Jan de Meester, "To Kill Two Birds with One Stone: Keeping Immigrants in by Granting Free Burghership in Early Modern Antwerp," in *Innovation and Creativity in Late Medieval and Early Modern European Cities*, ed. by Karel Davids and Bert De Munck (Farnham: Ashgate, 2014), 95-113, p. 101.

⁵⁵ De Munck and Karel Davids, "Beyond Exclusivism," p. 199.

⁵⁶ De Munck and Karel Davids, "Beyond Exclusivism," p. 199.

⁵⁷ Meester, "To Kill Two Birds".

⁵⁸ Meester, "To Kill Two Birds," p. 112-13.

Beyond citizenship therefore, historians have emphasised how granting privileges was the main tool available to urban governments for attracting skilled migrants. Studying immigration to early modern English towns, Esser notes that urban governments sought to attract migrants with innovative manufacturing knowledge by offering specific settlement and business rights issued by town authorities.⁵⁹ This was particularly the case for Dutch and Walloon textile workers whom English authorities hoped would introduce their expertise in fashionable fabrics to the English market.⁶⁰ Returning to Antwerp, Boone and Stabel outline how various subsidies for housing, economic infrastructure, and equipment were used to attract skilled migrants.⁶¹ This was the case for the skilled serge weavers of Hondshoote in 1582 who, following the sack of their town, were offered free housing and permission to enter a guild without becoming a burgher in order to attract their specialist knowledge.⁶² Whilst these measures by urban governments indirectly sought to stimulate innovation within their cities – offering habitable conditions in which arriving artisans could thrive – historians have pointed to more direct actions that were taken. Initially implemented in the medieval period, Long notes that by the fifteenth century, Venice, along with other European cities, granted patents to entice innovative artisans, often taking the form of time-limited monopoly privileges.⁶³ This measure sought to stimulate innovation more directly, not just generally attracting skilled migrants but actively incentivising them to impart their novel knowledge.⁶⁴ Belfanti situates this practice within the urban context more broadly, noting how in Northern Italian cities, patents issued by local governments worked symbiotically with the guild system in disseminating and

⁵⁹ Raingard Esser, “They Obey All Magistrates and All Good Lawes... and We Thinke Our Cittie Happie To Enioye Ehem: Migrants and Urban Stability in Early Modern English Towns,” *Urban History* 34, no. 1 (2007): 64-75, p. 66-67.

⁶⁰ Esser, “They Obey All Magistrates”, p. 67.

⁶¹ Marc Boone and Peter Stabel, “New Burghers in the Late Medieval Towns of Flanders and Brabant: Conditions of Entry, Rules and Reality,” in *Neubürger im späten Mittelalter. Migration und Austausch in der Städtelandschaft des alten Reiches (1250–1550)*, ed. Rainer C. Schwinges (Berlin: Duncker & Humboldt, 2002).

⁶² Boone Stabel, “New Burghers”, p. 321.

⁶³ Pamela Long, *Openness, Secrecy, Authorship: Technical Arts and the Culture of Knowledge from Antiquity to the Renaissance* (Baltimore: John Hopkins University Press, 2001), p. 91-93.

⁶⁴ Long, *Openness, Secrecy*, p. 93.

embedding technical knowledge.⁶⁵ Guilds had been responsible for the accumulation of knowledge that allowed specialities to develop that distinguished each centre from one another. Yet unlike the patent system, the guild system did not stimulate the introduction of new techniques to a city due to its frequent tendency towards trade secrecy.⁶⁶ Belfanti thus highlights an interesting institutional overlap, a ‘two-speed system’ in which guilds represented incremental progress over time supplemented by more sporadic introduction of foreign innovations via patenting.⁶⁷ Through their granting of privileges therefore, urban governments could thus simultaneously shape the movement of knowledge within and between cities as well as the extent of artisanal innovation.

Returning to the more holistic way of viewing cities as complex networks advocated in the previous section, valuable parts of the historiography have explored how the interaction of different guild and municipal governmental institutions shaped artisanal knowledge. Hilaire-Perez’s work on silk manufacture in Lyon exemplifies this in which she presents the city as a hub of ‘open technique’ whereby different institutions collaborated in a broadly ‘municipalist’ way.⁶⁸ Here existed a culture of collective management of invention in which techniques circulated fluidly amongst the community. A key element of this culture was how the silk guild, the Grande Fabrique, worked with the town council in the provision of public funding for inventions rather than granting monopoly concessions, thereby preventing gatekeeping of trade secrets by compensating inventors for making their innovations public.⁶⁹ Municipal institutions and the Grand Fabrique also collaborated in certifying and ratifying this new knowledge by collectively determining the technical efficiency and value of new inventions as well as their public utility.⁷⁰ Looking at

⁶⁵ Belfanti, “Guilds, Patents”.

⁶⁶ Belfanti, “Guilds, Patents”.

⁶⁷ Belfanti, “Guilds, Patents, p. 580.

⁶⁸ Liliane Pérez, “Inventing in a World of Guilds: Silk Fabrics in Eighteenth-century Lyon,” in *Guilds, Innovation and the European Economy, 1400–1800*, ed. by S.R. Epstein and Maarten Prak (Cambridge: Cambridge University Press, 2008), 232-63.

⁶⁹ Pérez, “Inventing in a World of Guilds,” p. 243-44.

⁷⁰ Pérez, “Inventing in a World of Guilds,” p. 245-48.

individual inventions, Pérez demonstrates how this institutional arrangement led to a wider diffusion of artisanal knowledge within the city, one example being the Falcon loom.⁷¹ Grandi's analysis of Northern Italian soap production similarly looks at how the interaction between institutions shaped artisanal knowledge, specifically the interactions between different guilds.⁷² In Venice from the fifteenth century, separately organised guilds existed for soap production, candle production, and leather finishing, all of which relied on vegetable and animal fats.⁷³ Simultaneously, textile guilds had a strong say in soap-production since the quality of their products depended on the soap they used.⁷⁴ Grandi outlines how this intricate institutional web regulated which innovations could be introduced due to the repercussive effects that it could generate in surrounding industries.⁷⁵ Unlike in Lyon, this case reveals how the specific institutional arrangement could have a limiting impact on knowledge diffusion and invention. These studies thus demonstrate how the specific institutional arrangements within cities shaped artisanal knowledge in idiosyncratic ways.

A portion of the literature has also highlighted various urban institutions that mediated artisanal knowledge that operated alongside local governments and guilds. Regarding textile manufacture in Padua and Venice from the sixteenth to the eighteenth centuries, Caracausi highlights the role played by charitable institutions such as hospitals and orphanages, often directed by woollen and silk merchants, in transmitting knowledge of hosiery manufacture such as plain ribbon weaving.⁷⁶ This is an interesting insight into how women accumulated

⁷¹ Pérez, "Inventing in a World of Guilds," p. 250-51.

⁷² Alberto Grandi, "The Secret Perfume: Technology and the Organization of Soap Production in Northern Italy between the Sixteenth and Eighteenth Centuries," in *Innovation and Creativity in Late Medieval and Early Modern European Cities*, ed. by Karel Davids and Bert De Munck (Farnham: Ashgate, 2014), 115-30.

⁷³ Grandi, "The Secret Perfume".

⁷⁴ Grandi, "The Secret Perfume," p. 116.

⁷⁵ Grandi, "The Secret Perfume".

⁷⁶ Andrea Caracausi, "Textiles Manufacturing, Product Innovations and Transfers of Technology in Padua and Venice between the Sixteenth and Eighteenth Centuries," in *Innovation and Creativity in Late Medieval and Early Modern European Cities*, ed. by Karel Davids and Bert De Munck (Farnham: Ashgate, 2014), 131-60.

artisanal knowledge in urban settings outside the male-dominated guild structure. Similarly, Crowston examines the role of charitable schools for poor children opening in Paris from the late-seventeenth century which, for girls, blended Catholic teaching with instruction in needlework with the express intention of preparing them for the labour market.⁷⁷ Similar institutions emerged in different parts of Western Europe particularly where the lace industry boomed and thus where the knowledge acquired was valuable, such as Antwerp and Brussels.⁷⁸ Regarding Parisian charitable schools for boys, Crowston also notes how these institutions consciously fulfilled a ‘pre-training’ role for apprenticeships, noting for instance how the 1665 regulations of the charity schools in the Saint Paul’s parish explicitly required administrators to try and place out-going boys in apprenticeships.⁷⁹ Though they did not instruct on specific technical skills, by making children literate and teaching them to sit still and to be obedient to their masters, they sought to prime students to absorb the knowledge imparted by a master.⁸⁰ This is an interesting case study in that again it exemplifies interaction and overlap between different urban institutions in fostering the accumulation of knowledge. In a different vein, Lyna reveals the importance of fine art academies and public drawing schools for disseminating artisanal skills and stimulating creativity in Antwerp and other European cities in the late-seventeenth and eighteenth centuries.⁸¹ Scrutinizing enrolment lists to look at the background of entrants, she demonstrates that the Antwerp Academy of Fine Arts was crucial in training artisans within the city’s creative industries.⁸² For instance, engravers and plate cutters often attended drawing

⁷⁷ Clare Crowston, “From School to Workshop: Pre-training and Apprenticeship in Old Regime France,” in *Learning on the Shop Floor: Historical Perspectives on Apprenticeship*, ed. by Bert De Munck, Steven L. Kaplan, and Hugo Soly (New York: Berghahn Books, 2007), 46-62, p. 50-51.

⁷⁸ Bert De Munck and Hugo Soly, “Learning on the Shop Floor in Historical Perspective,” in *Learning on the Shop Floor: Historical Perspectives on Apprenticeship*, ed. by Bert De Munck, Steven L. Kaplan, and Hugo Soly (New York: Berghahn Books, 2007), 3-32, p. 8.

⁷⁹ Crowston, “From School to Workshop,” p. 50-53.

⁸⁰ Crowston, “From School to Workshop,” p. 52-53.

⁸¹ Dries Lyna, “Harbouring Urban Creativity: the Antwerp Art Academy in the Tension between Artistic and Artisanal Training in the Late Seventeenth and Eighteenth Centuries,” in *Innovation and Creativity in Late Medieval and Early Modern European Cities*, ed. by Karel Davids and Bert De Munck (Farnham: Ashgate, 2014), 295-313.

⁸² Lyna, “Harbouring Urban Creativity,” p. 306.

and geometry classes at the Academy.⁸³ This literature thus demonstrates how artisanal knowledge could be proliferated by a selection of urban institutions that existed beyond the boundaries of the guild and the urban government.

Overall, the literature on how urban institutions shaped artisanal knowledge has been dominated by the discussion of manufacturing guilds and their role within tacit knowledge transfer. Though a highly important area, it has been necessary to move beyond this focus to broaden our understanding of how craft knowledge was mediated. Key contributions in this historiographical direction have analysed the role of urban governmental institutions and how they propelled the interurban transmission of knowledge and innovation through citizenship controls, but to a greater extent through the granting of privileges. Returning to the framing of cities as idiosyncratic assemblages of actors, some contributions have analysed how interactions within specific institutional arrangements shaped artisanal knowledge in very specific, localised ways. Finally, some historians have sought to analyse lesser explored urban institutions, notably the variegated selection of educational institutions, further broadening our vision of the complex networks that mediated artisanal knowledge.

Cities and Markets

Another broad strand within the literature that helps us understand how artisanal knowledge and the urban were connected is through market dynamics. When thought of in market terms, early modern cities can in a different way be understood as complex assemblages of constantly interacting actors that influenced artisanal knowledge in varying ways. Both within cities and between cities, the dynamic interconnectedness of consumers and producers shaped how knowledge was both formulated and circulated.

⁸³ Lyna, “Harbouring Urban Creativity,” p. 306.

Historians have pointed to the often-high levels of luxury consumption within cities as driving innovation as artisanal producers competed to meet demand. Jedwab et al. explore the Malthusian mechanism in premodern cities whereby urban citizens received higher wages and thus had a greater propensity to consume luxury goods.⁸⁴ Alongside this more broad-based understanding of urban consumption, other historians have noted that demand for luxuries was driven by elites who increasingly resided in cities throughout the early modern period.⁸⁵ Trentman notes how amongst European elites, a culture of consumption developed which emphasised personal beauty and self-fashioning that was intertwined with possessions becoming more numerous.⁸⁶ Relatedly, Lyna explores how the early modern period marked a trend of ‘fashionable’ becoming more highly valued than ‘durable’ for the luxury consumer which led to an expansion of differentiated demand.⁸⁷ Within Italian urban contexts, Burke posits that conspicuous consumption of various luxury goods was evident amongst Venetian patricians as a means of accentuating one’s social status.⁸⁸ Hilaire-Pérez’s work on the London toy market exemplifies how urban consumption impacted upon artisanal knowledge.⁸⁹ Seeking to meet the vast demand for novelties and beautiful things, a concentration of highly specialized artisans developed in the city who competed, collaborated, and experimented, with knowledge being both shared and produced in the process.⁹⁰ Matthew Martin notes too how in the highly fashion-driven porcelain market in London in the mid-eighteenth century, innovation and responsiveness to consumer demand

⁸⁴ Remi Jedwab, Noel D. Johnson, and Mark Koyama, “Medieval Cities Through the Lens of Urban Economics,” *Regional Science and Urban Economics* 94 (2022): 1-11, p. 8-9.

⁸⁵ Peter Clark, *European Cities and Towns: 400-2000* (Oxford; New York: Oxford University Press, 2009), p. 141-43.

⁸⁶ Frank Trentmann, *Empire of Things: How We Became a World of Consumers, From the Fifteenth Century to the Twenty First* (London: Allen Lane, 2016), p. 29-30.

⁸⁷ Dries Lyna, “Harbouring Urban Creativity: the Antwerp Art Academy in the Tension between Artistic and Artisanal Training in the Late Seventeenth and Eighteenth Centuries,” in *Innovation and Creativity in Late Medieval and Early Modern European Cities*, ed. by Karel Davids and Bert De Munck (Farnham: Ashgate, 2014), 295-313, p. 310-11.

⁸⁸ Peter Burke, *The Historical Anthropology of Early Modern Italy: Essays on Perception and Communication* (Cambridge: Cambridge University Press, 1987), p. 132-50.

⁸⁹ Liliane Hilaire-Pérez, “The Codification of Techniques: Between Bureaucracy and the Markets in Early Modern Europe from a Global Perspective,” *Technology and Culture* 62, no. 2 (2021): 442-466.

⁹⁰ Hilaire-Pérez, “The Codification of Techniques”.

were essential, with openness to knowledge sharing amongst artisans in cognate trades proving crucial for survival.⁹¹ Acting as hubs of luxury consumption therefore, cities could shape artisanal knowledge in line with prevailing local fashions.

The increasing urban demand for luxury goods beyond Europe also impacted on the artisanal knowledge base in a variety of ways. The literature on this topic, as one would expect, focuses on the port cities that were receiving these goods. Styles explores how consumer demand for Chinese ceramics in London from the late-sixteenth century stimulated a process of product innovation amongst the city's artisans as they sought to imitate Asian imports.⁹² London delFTWARE potters initially developed a version of the highly prized Chinese porcelain teapot using cheaper local materials.⁹³ This in turn inspired the city's silversmiths to reconstitute the teapot as a silver object, capitalising on the prevailing consumer association of silver with politeness and prestige.⁹⁴ Here, Styles conveys how artisanal innovation could stem from a blending of fashions within a commercial metropolis. Berg highlights how this process of innovation through imitation similarly occurred amongst artisans in Birmingham which, though not a port city, responded to the demand for the 'exotic' from the capital, producing popular imitative tea wares and japanned wares.⁹⁵ In doing so, artisanal knowledge was broadened with advances made in mechanical techniques such as moulding as well as chemical innovations such as metal mixtures.⁹⁶ Beyond England, Clemente's study of the ceramic industry in Naples, both a capital city and a port city and where luxury demand was consequently high, reveals a similar process of artisans imitating imported Asian porcelain in response to aristocratic

⁹¹ Matthew Martin, "Making and Marketing Porcelain in Eighteenth Century London," in *Republic of Skill: Artisan Mobility, Innovation, and the Circulation of Knowledge in Premodern Europe*, ed. by David Garrioch (Leiden; Boston: Brill, 2022), 169-91.

⁹² John Styles, "Product Innovation in Early Modern London," *Past & Present* 168 (2000): 124-169.

⁹³ Styles, "Product Innovation," p. 141-42.

⁹⁴ Styles, "Product Innovation," p. 146-47.

⁹⁵ Maxine Berg, "From Imitation to Invention: Creating Commodities in Eighteenth-Century Britain," *The Economic History Review* 55, no. 1 (2002): 1-30.

⁹⁶ Berg, "From Imitation to Invention," p. 26.

demand.⁹⁷ In partly achieving this, the epistemic base was widened, with innovations introduced in the composition of ceramic paste and in the firing process.⁹⁸ By acting as key markets for goods beyond Europe therefore, European cities shaped artisanal knowledge as craftsmen sought to meet to the various demands for luxury goods.

The increasingly interconnected European goods markets, within which cities acted as the key nodes, sparked rising interurban competition which shaped the formation and circulation of artisanal knowledge within different cities. Contributions here link to the context of growing international trade in this period as various transaction costs fell, enhancing interurban competition. As Caracausi discusses regarding Italian textile manufacture, with fashions in European cities shifting away from Paduan textiles from the mid-seventeenth century, Paduan manufacturers adapted through a process of imitation.⁹⁹ For example, as silk manufacture from French cities such as Lyon began to dominate within both domestic and foreign markets, Paduan manufacturers sought to cope by introducing designed trimming in the Lyonnais style.¹⁰⁰ The interurban competition to meet evolving consumer demands thereby drove the circulation of knowledge between cities. Analysing the Venetian glassmaking industry, Trivelatto outlines how Venetian dominance was challenged during the seventeenth century by inventions exported from elsewhere such as the lead-based crystal patented in England.¹⁰¹ In contrast to Caracausi's case study, Venetian manufacturers sought to innovate rather than simply imitate. For example, they experimented with various new materials to maintain quality whilst making production cheaper or quicker, one such example being the partial replacement of quartziferous pebbles by a kind of sand that was pure and rich in

⁹⁷ Alida Clemente, "Innovation in the Capital City: Central Policies, Markets and Migrant Skills in Neapolitan Ceramic Manufacturing in the Eighteenth Century," in *Innovation and Creativity in Late Medieval and Early Modern European Cities*, ed. by Karel Davids and Bert De Munck (Farnham: Ashgate, 2014), 315-35.

⁹⁸ Clemente, "Innovation in the Capital City," p. 327.

⁹⁹ Caracausi, "Textiles Manufacturing," p. 137-39.

¹⁰⁰ Caracausi, "Textiles Manufacturing," p. 138-39.

¹⁰¹ Trivelatto, "Guilds, Technology," p. 225-26.

silica but much less expensive.¹⁰² This study reveals how inter-urban transfer of goods within and beyond Europe stimulated competition between cities that encouraged artisans not just to intuit knowledge embedded in imported objects but to innovate in order to challenge within the market.

Finally, turning to codified knowledge the budding print market of the early modern period has been an important consideration in how artisanal knowledge was circulated within cities. Cities are important sites in this regard since early modern print media was a largely urban phenomenon. Dittmar acknowledges that the market for print was overwhelmingly urban, not only because of greater wealth in cities but also because print media was costly to transport due to being heavy, fragile, and sensitive to damp.¹⁰³ Though Epstein posits that tacit knowledge spread through interurban migration was more significant than print throughout this period, he does not afford close attention to the circulation of printed technical knowledge within cities.¹⁰⁴ Davids provides evidence of print circulating artisanal knowledge within cities noting the example of ‘machine books’, written treatises with different mechanical illustrations.¹⁰⁵ One such example was the *Architectura Mechanica Moole Boek*, a mill book published in Amsterdam in 1686.¹⁰⁶ In London, Puetz notes how the print market offered a variety of often affordable publications aimed at improving the design of manufactured goods, particularly in the fields of textiles, woodcarving, and furniture, including drawing and model books, treatises, and ornament prints.¹⁰⁷ Wallis nuances this discussion by looking at the life cycle of an artisan’s process of learning.¹⁰⁸ As an apprentice, by far the most important mode of training was

¹⁰² Trivelatto, “Guilds, Technology,” p. 225-26.

¹⁰³ Jeremiah Dittmar, “Information Technology and Economic Change: The Impact of The Printing Press,” *The Quarterly Journal of Economics* 126, no. 3 (2011): 1133-1172, p. 1140.

¹⁰⁴ Epstein, “Transferring Technical Knowledge”.

¹⁰⁵ Karel Davids, “Moving Machines-Makers: Circulation of Knowledge on Machine-Building in China and Europe Between C. 1400 and The Early Nineteenth Century,” in *Technology, Skills and the Pre-Modern Economy in the East and the West*, ed. Maarten Prak and Jan Luiten van Zanden (Leiden: Brill, 2013): 205-24.

¹⁰⁶ Davids, “Moving Machines-Makers,” p. 220.

¹⁰⁷ Anne Puetz, “Design Instruction for Artisans in Eighteenth-Century Britain,” *Journal of Design History* 12, no. 3 (1999): 217-239.

¹⁰⁸ Patrick Wallis, “Between Apprenticeship and Skill: Acquiring Knowledge Outside the Academy in Early Modern England,” *Science in Context* 32, no. 2 (2019): 155-170.

not through print but by participating in production, gaining tacit knowledge through repetitive practice. However, the more advanced artisans seeking self-improvement did utilize printed materials which allowed access to relevant theoretical and scientific information.¹⁰⁹ As more general evidence that print was significant in spreading artisanal knowledge, Van Zanden notes that in European cities throughout the sixteenth and seventeenth century, artisans published a large range of 'how-to' books as they began to be sold at increasingly affordable prices for ordinary craftsmen. Additionally, Binzel et al.'s study of language and print at the city level reveals that the rise in vernacular printing, particularly following the Protestant Reformation, further expanded the access of artisans and to codified knowledge.¹¹⁰ Aside from consuming knowledge through print, Hilaire-Pérez notes how artisans utilized print to communicate technological understanding to the consumer.¹¹¹ For instance, 'How-To-Use' leaflets for the consumer were disseminated by urban intermediaries such as booksellers.¹¹² In this commercialization of knowledge, the artisan skill was invested in print to verify their products within the market and by extension their technique. Artisanal knowledge thus seeped out of the workshop and into the public realm through the general development of technical erudition through for example knowledge of technical vocabulary or taxonomies of products and materials.¹¹³ Codification within the urban print market thus represented an interested channel through which artisanal knowledge was mediated and demands greater academic attention.

Intra- and interurban markets constituted complex networks of producers and consumers with artisanal knowledge being shaped by their constant and evolving interactions. Historians have emphasised how cities increasingly represented hubs of luxury consumption of both domestic and foreign goods, and

¹⁰⁹ Wallis, "Between Apprenticeship and Skill," p. 166-68.

¹¹⁰ Christine Binzel, Andreas Link, and Rajesh Ramachandran, "Language, Knowledge, and Growth: Evidence from Early Modern Europe," CEPR Discussion Paper 15454 (2023a).

¹¹¹ Liliane Hilaire-Pérez, "Technology as a Public Culture in the Eighteenth Century: The Artisans' Legacy," *History of Science* 45, no. 2 (2007): 135-153, p. 144-46.

¹¹² Hilaire-Pérez, "Technology as a Public Culture," p. 145-46.

¹¹³ Hilaire-Pérez, "Technology as a Public Culture," p. 146.

how artisanal knowledge was circulated and fabricated as manufacturers sought to meet the ever-expanding demand. Additionally, it has been important to acknowledge the role of competition within the European urban network in which a city's position regarding the broader continental market informed the decisions of resident artisans on innovation. Important attention too has been paid to the urban print market with the focus being placed upon artisans not just as producers, but as consumers within the knowledge economy.

Conclusion

This critical review has sought to bring together the literatures from urban history and the history of science and technology to more closely understand the connections between early modern cities and the formation and dissemination of artisanal knowledge. A key approach in this regard has been that of agglomeration theory which, through discussion of labour market pooling and knowledge spillovers, provides a theoretical basis for how the proximity of urban areas impacted upon artisanal knowledge. Whilst a highly valuable approach, agglomeration theory presents a generalised view of cities thereby ignoring the nuances and idiosyncrasies of different environments. Some voices within the literature have thus supported focusing on urban specificity rather than urban sameness. Rather than mere agglomeration, cities should be viewed as complex, dynamic, and heterogenous networks of constantly interacting actors that disseminated and formulated artisanal knowledge in diverse ways.

In responding to this criticism, two historiographical themes that encompass overlap between cities and artisanal knowledge were utilized to present cities as localised idiosyncratic networks, the first being urban institutions. Within this literature, urban craft guilds constitute a key historiographical focus due to their role within tacit knowledge transfer. Though highly important, our understanding of how cities mediated artisanal knowledge is broadened by focusing on other institutions such as urban governments and charitable educational institutions. Taking this further, some scholars have emphasised

how knowledge is fabricated through the interaction of different urban institutions. This helps us to comprehend the locality of knowledge and how its production and circulation was shaped by different urban institutional milieux. The literature on cities as markets was then analysed, with urban Europe representing a complex assemblage of constantly interacting consumers and producers both within cities and between cities. With expanding urban luxury consumption throughout the early modern period, cities represented stimuli for innovation and the formulation of new craft knowledge as producers sought to satiate demand. Yet the increasingly interconnected nature of urban markets both within and beyond Europe also informed the dissemination of knowledge as artisans sought to intuit and imitate techniques embodied by circulating objects, particularly within port cities. The specific dynamics between consumers and producers within the urban network at any given time thus shaped artisanal knowledge.

In sum, this review has explored the overlaps between urban history and the history of artisanal knowledge, specifically emphasising the need to understand urban specificity and locality when considering how knowledge was produced and circulated. Regarding the broader debate on the role of artisanal knowledge within European technological development, it has thus advocated a nuanced perspective on the spatial dimension of knowledge.

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