

5. The New Pathways of Knowledge: Early Modern Iberian Oceanic Rutters and the Emergence of a Global Knowledge Society

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Abstract: This chapter examines the rise of Iberian empires as a global knowledge society during the early modern period, focusing on the production and circulation of nautical rutters. Despite having lower urbanization and less intellectual freedom than other European regions, Portugal and Spain fostered multicultural empires through extensive knowledge networks. The chapter analyzes how knowledge, particularly in navigation and cartography, drove expansion. Nautical rutters, as both technical documents and literary works, shaped maritime knowledge dissemination. Key works like Pero Magalhães de Gândavo's *Tratado da Terra do Brasil* (1569) and André Donelha's *Descrição dos Rios da Serra Leoa* (1625) illustrate how rutters served as epistemic scaffolds, integrating diverse knowledge fields and linking local insights to global strategies.

Keywords: early modern knowledge societies, non-specialized knowledge agents, Iberian knowledge economies, Atlantic rutters, trans-imperial information exchange, epistemic circulation

Introduction

From the late fifteenth century onwards, the Iberian nations conquered vast territories from the Atlantic to the Pacific. They consolidated their dominance through trade, naval power, missionary activity, and bureaucracy. In many ways, these two great empires shared social and economic features,

entanglements that were reinforced by their dynastic union between 1580 and 1640 under the House of Habsburg. By expanding their commercial networks, both experienced considerable economic growth through trade and the production of diverse tradable commodities. From Guinean gold to Asian spices, from Peruvian silver to brazilwood—to say nothing of sugar production and the slave trade—the Iberian empires benefited from a panoply of economic cycles without ultimately depending on them. However, there was one commodity which these two complex imperial systems relied upon entirely: knowledge.

Recent studies have pointed out the possibility of the emergence of early modern “knowledge societies” as being linked to a combination of specific socio-economic conditions. Such conditions provided the “activation energy” necessary for the flourishing of an economy based on the production and circulation of knowledge. In the Low Countries, for example, between the sixteenth and the late eighteenth centuries, reasonably high degrees of urbanization and population density, literacy rates, and monetization of commercial activities, combined with a certain degree of religious freedom and tolerance for the circulation of ideas, permitted the development of a dynamic market for knowledge and its artifacts.¹

This chapter argues that, from the late fifteenth century onwards, the Iberian empires emerged as a joint, and increasingly global, knowledge society. However, compared to other areas of Europe, such as the Low Countries, the Rhine valley, or Northern Italy, the Iberian nations were considerably less urbanized. Their scope of intellectual and economic freedom was also significantly lower, especially when measured against the Low Countries, England, certain areas in the north of the Italian Peninsula, and the German-speaking countries.² Even under these conditions, Portugal and Spain established multicultural empires entirely dependent on networks of production, accumulation, and transmission of knowledge at a global level. Rather than creating separate national or regional niches of knowledge production, the sixteenth-century expansionist process promoted the

1 Bert De Munck and Antonella Romano, “Knowledge and the Early Modern City: An Introduction,” in *Knowledge and the Early Modern City: A History of Entanglements*, ed. Bert De Munck and Antonella Romano (Abingdon: Routledge, 2019), 1–30; Inger Leemans and Anne Goldgar, *Early Modern Knowledge Societies as Affective Economies* (Abingdon: Routledge, 2020); Dániel Margócsy, *Commercial Visions: Science, Trade, and Visual Culture in the Dutch Golden Age* (Chicago: University of Chicago Press, 2014).

2 Daron Acemoglu, Simon Johnson, and James Robinson, “The Rise of Europe: Atlantic Trade, Institutional Change, and Economic Growth,” *American Economic Review* 95, no. 3 (2005): 546–579.

circulation of people and knowledge on a scale never seen before, connecting (via the Iberian Peninsula) the Mediterranean to West Africa, India to Brabant, and the Alps to America.

The transformation of the Iberian empires into knowledge societies can be traced in studies on the development of diverse fields of scientific knowledge from at least the mid-fifteenth century.³ Progress in many such areas required combining elements of both practical and theoretical knowledge. Together, these fields contributed decisively to making knowledge the driving force behind the expansionist process.

Because the Iberian imperial project hinged upon navigation between far-flung sites, it required knowledge that could bring together advances in mathematics, astronomy, shipbuilding, and the production of nautical instruments. This could, and did, serve as scaffolding for the construction and expansion of knowledge in other fields (such as natural philosophy and cartography). In this context, the production of nautical rutters, and their consolidation as a literary genre, can be used as an archetypal case.

In the pages to follow, I will attempt to show that the development of oceanic rutters during the sixteenth and seventeenth centuries was crucial for the birth of the Iberian knowledge society. First, I will define “knowledge societies” and establish the parameters for applying the concept to the analysis of early modern societies. I then provide a contextualization of the evolution of nautical rutters, both as a specific field of knowledge production and as a distinct literary genre. Finally, I apply these concepts to the analysis of mid-sixteenth and early seventeenth-century rutters: Pero Magalhães de Gândavo’s *Tratado da Terra do Brasil* (1569), André Donelha’s *Descrição dos Rios da Serra Leoa* (1625), and Gabriel Soares de Sousa’s *Roteiro Geral* (1587).⁴

3 Jorge Cañizares-Esguerra, “Iberian Science in the Renaissance: Ignored How Much Longer?” *Perspectives on Science* 12, no. 1 (2004): 86–124; Henrique Leitão, “All Aboard! Science and Ship Culture in Sixteenth-Century Oceanic Voyages,” *Early Science and Medicine* 21, no. 2–3 (2016): 113–132; Antonio Sánchez and Henrique Leitão, “La ciencia ibérica: ¿Aparte o parte de la ciencia moderna?” *Revista de Occidente* 433 (2017): 5–18.

4 Pero de Magalhães Gândavo, *Tratado da Terra do Brasil: História da Província Santa Cruz, a que vulgarmente chamamos Brasil* (Brasília: Senado Federal, Conselho Editorial, 2008); André Donelha, *Descrição da Serra Leoa e dos Rios de Guiné do Cabo Verde* (1625): *An Account of Sierra Leone and the Rivers of Guinea of Cape Verde* (1625) (Lisboa: Junta de Investigações Científicas do Ultramar, 1977); Gabriel Soares de Sousa, *Tratado Descritivo do Brasil em 1587* (São Paulo: Companhia Editora Nacional, Série Brasileira, 1971).

5.1. Early Modern Knowledge Societies and the Circulation of Knowledge

The expression “knowledge society” describes a group engaging in a collective and organized effort to gather, process, and disseminate information and knowledge on a large scale.⁵ The term was first employed by economists and sociologists of the post-Second World War generation, such as Fritz Machlup⁶ and Peter Drucker,⁷ in an attempt to estimate the contribution of knowledge work to the economy. They developed theories on how the social sciences could deal with the social changes caused by the rise of information technologies and their impact on knowledge work. Some years later, with the studies of Daniel Bell,⁸ a more comprehensive understanding of such matters was elaborated, dealing with the nature of post-industrial societies and the role of theoretical knowledge as their new “axial principle” (that is, as the impetus for economic growth).

Since these early efforts, research on the concept of “knowledge society” has increasingly focused on two dimensions: the consequences of technological innovation⁹ and the function of institutions in the regulation of knowledge production processes.¹⁰ Following this path, sociological and historical inquiry has concentrated on the extent to which technological developments influence structural changes in organizational and cultural institutions.¹¹ When applied to the study of contemporary societies, the notion of “knowledge society” relates to the widespread influence of data networks (often computer-based) on the processes of gathering, reproduction, storage, circulation, and management of information about diverse aspects of collective and individual life. Knowledge societies also tend to establish, either through direct state intervention or through self-organized processes, systems for the production, accumulation, and sharing of knowledge through educational institutions, informal societies, or corporations of experts. The concept of “knowledge

5 Wolfgang Krohn, “Knowledge Societies,” in *International Encyclopedia of Social and Behavioral Sciences* (Amsterdam: Elsevier, 2001), 12:8139–8143.

6 Fritz Machlup, *The Production and Distribution of Knowledge in the United States* (Princeton: Princeton University Press, 1962).

7 Peter Drucker, *The Age of Discontinuity: Guidelines to Our Changing Society* (London: Routledge, 2017).

8 Daniel Bell, *Post-Industrial Society* (London: Routledge, 2020).

9 Nico Stehr, “Modern Societies as Knowledge Societies,” in *Handbook of Social Theory*, ed. George Ritzer and Barry Smart (London: Sage Publications, 2003), 494–508.

10 Jürgen Renn, “From the History of Science to the History of Knowledge – and Back,” *Centaurus* 57, no. 1 (2015): 37–53.

11 Krohn, “Knowledge Societies,” 8139–8143.

society” thus asks how researchers, experts, and analysts deal with both the challenge of making sense of information, and the knowledge-based strategies used by individuals and institutions for decision-making.

In this sense, while knowledge, not production or trade, becomes the catalyst of economic development, individuals belonging to professional groups and corporations tend to share information and knowledge specific to their professions with other social and professional groups and corporations, increasing the number of agents able to produce knowledge and promote its circulation.¹²

Over the last decades of the twentieth century, academic and public attention extended the general concept of a social centrality of knowledge to a wide range of fields of inquiry. Attention was paid to the transformations of the class structure in knowledge societies, its relationship with globalization, the diffusion of specialized culture, and the relevance of intellectual capital together with its impact on economic fluctuations.¹³ The term “knowledge society” has come to be used comprehensively, insofar as it pertains to the idea of broad-spectrum social changes. However, given the uneven distribution of the conditions under which knowledge societies can develop, Nico Stehr’s proposal for an analytical division comprising different patterns of knowledge societies has been broadly accepted. This division implies that knowledge societies do not emerge as contingent and necessary developments from a common evolutionary pattern and, therefore, cannot be understood as monolithic social arrangements. Rather, they become comparable by maintaining or acquiring distinctiveness. It is precisely this feature that has enabled the concept “knowledge society” to resonate beyond the scope for which it was initially designed.¹⁴ Scholars of both the history of science tradition and the emerging field of the history of knowledge have recently sought to historicize the notion of the knowledge society,¹⁵ starting from the assumption that every age is, in a certain respect, an age of knowledge.¹⁶ As diverse as they are, past and present knowledge societies

12 Roberto M. Unger, *Knowledge Economy* (London: Verso Books, 2019).

13 Krohn, “Knowledge Societies,” 8139–8143; Unger, *Knowledge Economy*.

14 Stehr, “Modern Societies as Knowledge Societies,” 494–508.

15 Peter Burke, *What Is the History of Knowledge?* (Cambridge: Polity Press, 2016); Lucas M. Verburgt, “The History of Knowledge and the Future History of Ignorance,” *KNOW: A Journal on the Formation of Knowledge* 4, no. 1 (2020): 1–24; De Munck and Romano, “Knowledge and the Early Modern City”; Leemans and Goldgar, *Early Modern Knowledge Societies*.

16 Stehr, “Modern Societies as Knowledge Societies”; Kajsa Brillman, “The Circulation of Knowledge in Translations and Compilations,” in *Circulation of Knowledge: Explorations in the History of Knowledge*, ed. Johan Östling et al. (Lund: Nordic Academic Press, 2018).

share at least one common characteristic: their economic development depends largely on producing, accumulating, and circulating knowledge across social strata. However, as virtually all human societies produce knowledge and develop myriad mechanisms for its accumulation, special attention should be given to the circulation processes themselves, and how institutions and networks, be they formal or self-organized, are implicated.

In historical terms, knowledge production and circulation are linked to the establishment of communicational processes¹⁷ often involving coercion and social, economic, or racial inequality.¹⁸ With this in mind, thinking in terms of circulation principles is currently gaining ground among the upcoming generation of historians.¹⁹ In early modern Europe, knowledge production, circulation, and consumption rapidly expanded, decisively contributing to fundamental changes in the existing social and economic organization. Through the invention of the printing press, the growth of power centralization and state control mechanisms, the funding of new kinds of knowledge institutions, and the development of new trade networks and companies, early modern Atlantic trader²⁰ societies, through a global and interactive process, evolved to be highly dependent on rapid movement of information and knowledge.²¹

By that time, knowledge could circulate swiftly between distant parts of the globe, particularly those connected through the networks and institutions set up by the Iberian empires. In the early seventeenth century, for example, medical and pharmaceutical knowledge produced in, say, Portuguese India or at the Jesuit missions in Indochina could reach the dignitaries of Philip II's court in Madrid in less than a year, or even missionaries in Peru, colonial authorities in Mexico, or settlers in Brazil.²² The

17 James A. Secord, "Knowledge in Transit," *Isis* 95, no. 4 (2004): 654–672.

18 Marie Louise Pratt, *Imperial Eyes: Travel Writing and Transculturation* (Abingdon: Routledge, 1992); Richard White, *The Middle Ground: Indians, Empires, and Republics in the Great Lakes Region, 1650–1815* (Cambridge: Cambridge University Press, 2001).

19 For a comprehensive overview of how historians of science and knowledge have explored the concept of circulation of knowledge, see: Kapil Raj, *Relocating Modern Science: Circulation and the Construction of Knowledge in South Asia and Europe, 1650–1900* (Basingstoke: Palgrave Macmillan, 2010); Helge Wendt, *The Globalization of Knowledge in the Iberian Colonial World* (Berlin: Max Planck Institute for the History of Science, 2017); Johan Östling et al., *Circulation of Knowledge: Explorations in the History of Knowledge* (Lund: Nordic Academic Press, 2018).

20 Acemoglu, Johnson, and Robinson, "The Rise of Europe," 546–579.

21 As discussed in Östling et al., *Circulation of Knowledge*; De Munck and Romano, "Knowledge and the Early Modern City," and Margócsy, *Commercial Visions*.

22 Fabiano Bracht, *Ao ritmo das monções: Medicina, farmácia, história natural e produção de conhecimento na Índia portuguesa no século XVIII* (Porto: Edições Afrontamento, 2017).

multiple mechanisms of knowledge transfer that allowed such a circulation speed constituted a *sine qua non* for the emergence of a knowledge society. In this sense, the success of early modern Iberian empires was essentially the result of the expansion and acceleration of the processes of circulation of knowledge through individuals, artifacts (especially tradable goods), and ideas.²³ It is to be observed here that the historicization of transference and circulation processes is often tainted by the contemporary conception of border. Early modern boundaries were different both mentally and geographically,²⁴ and the circulation of knowledge was frequently dependent on personal connections that allowed people, products, and artifacts to cross them.²⁵

As a result of increased scholarly interest in the roots of contemporary knowledge societies,²⁶ recent research has addressed the role of specific historical conditions, such as the existence of urbanized hinterlands and the formation of a merchant class whose activities reached out globally. All this, combined with a high degree of intellectual (and religious) tolerance, literacy, mobility, and immigration, supported the formation of a market of knowledge consumers and, therefore, laid the groundwork for a knowledge economy.²⁷

Given the diversity of past knowledge societies, the prerequisites for their emergence are variable. In the case of the early modern Iberian worlds, the relative dispersion of urban networks, lower literacy rates, and curtailed intellectual and religious freedom necessarily point to different stimuli.²⁸ Compared with the Low Countries, the city-states of northern Italy, some regions of the Rhine valley, or even the territories ruled by the Hanseatic League, the Iberian Peninsula was more rural and, consequently, its knowledge consumer market was of a lower density. Additionally, as a direct result of the Counter-Reformation, institutional regulation of intellectual activity was tighter (an extreme example being Philip II's ban on his subjects studying abroad), not to mention the effects of the expulsion of the Jews and the constraints to which the "New Christians" were often

23 Bartolomé Yun Casalilla, *Os impérios ibéricos e a globalização da Europa (séculos XV a XVII)* (Lisboa: Temas e Debates, 2021).

24 Burke, *What Is the History of Knowledge?*; Bracht, *Ao ritmo das monções*.

25 Bracht, *Ao ritmo das monções*.

26 Sven Dupré and Geert Somsen, "The History of Knowledge and the Future of Knowledge Societies," *Berichte zur Wissenschaftsgeschichte* 42, no. 2–3 (2019): 186–199.

27 Leemans and Goldgar, *Early Modern Knowledge Societies*.

28 Stehr, "Modern Societies as Knowledge Societies," 494–508.

subjected.²⁹ Even so, one may hypothesize that through long-distance trade, the development of informal, self-organized networks, and the multiplicity of knowledge-producing cultural encounters and missionary activities, Iberian societies developed many of the conditions needed for large-scale and globally distributed information gathering and sharing. That is, they fulfilled key prerequisites for the cultivation of a knowledge society by other means.

It is now accepted that informal networks were a crucial player in the history of knowledge circulation in the early modern Iberian empires.³⁰ Such networks brought together a diverse set of agents including patrons, merchants, cartographers, apothecaries, physicians, and armchair savants, not to mention ship-owners, sailors, and pilots. Moreover, there is a growing historiographical tendency to study the Iberian empires as an articulated complex of knowledge production.³¹ Indeed, in addition to having been politically united for sixty years (between 1580 and 1640), these empires often shared knowledge through the intensive circulation of diverse practitioners, such as those listed above.³²

Due to their shared social, cultural, and economic characteristics, Portugal, Spain, and their colonial empires should not be treated in isolation. Since the *Reconquista*, narrow social, economic, and cultural connections developed between the Christian Peninsular kingdoms.³³ In this process, Iberian elites, nobility, clergy, and the mercantile and artisan communities developed bonds that enabled the interchange of monetary resources, tradable goods, people, and knowledge at the most varied levels. Even before the Iberian Union (1580–1640), in addition to the presence of Portuguese mercantile communities in cities such as Antwerp, Frankfurt, and London, the links between the interests of Castile, the Genoese financial elites, and the extensive commercial connections of the Aragonese with the Mediterranean world were long consolidated.³⁴ From the accession of the Habsburgs to the Spanish throne (1516), and the later union between Spain and Portugal (1580), the Iberian kingdoms became the nexus of a planetary political and economic system.³⁵ The early modern period found the Iberian

29 Casalilla, *Os impérios ibéricos*, 50–58.

30 Raj, *Relocating Modern Science*, 1

31 As discussed in Bracht, *Ao ritmo das monções* and Cañizares-Esguerra, “Iberian Science in the Renaissance.”

32 Sánchez and Leitão, “La ciencia ibérica”; Leitão, “All Aboard!”; Casalilla, *Os impérios ibéricos*.

33 As shown in Leitão, “All Aboard!”

34 Casalilla, *Os impérios ibéricos*, 59.

35 Ana Sofia Ribeiro, *Early Modern Trading Networks in Europe: Cooperation and the Case of Simon Ruiz* (Abingdon: Routledge, 2017).

kingdoms and their imperial complexes setting up worldwide information and knowledge networks that became fundamental to the economic growth of Europe, America, and even certain regions in Asia. Information and knowledge flows were crucial to decision-making throughout, leading to strategic choices at virtually every economic, political, and social level.

With this background in mind, at least two questions arise. Firstly, how does the variability of “knowledge” fit into the equation? And secondly, how could a body of knowledge transcend the specific niche of its development to permeate the activities of the groups who subsequently extended its use, thus integrating it into the circuits of a knowledge economy? The following section will address these questions. To do so, it will draw upon one of the most important corpora of knowledge for long-distance oceanic voyages and, consequently, for the expansion and consolidation of early modern colonial empires.

5.2. Nautical Rutters and the Emergence of a Global Knowledge Society

Alongside the development of ocean-going vessels, progress in astronomy, and the technological leap experienced in the manufacture of nautical instruments, early modern nautical rutters were the cornerstone of the long-distance voyages undertaken by Europeans from the second half of the fifteenth century onwards.³⁶ Artifacts that could easily be transmitted from hand to hand, nautical rutters (and ships’ logbooks) are technical documents that collected and analyzed critical information for the successful execution of oceanic navigation. In addition to the knowledge needed for long-distance navigation, such as distances, latitudes, currents, tides, and winds, these compendia also contained information about the natural world, geography, and peoples, and their cultural and political systems.

The advent of widely-disseminated written texts to guide navigation dates back to the late Middle Ages,³⁷ with two distinct traditions evolving in the Mediterranean and Northern Europe. In the Mediterranean, centuries of

36 Leitão, “All Aboard!” 125–127.

37 Richard W. Unger, “Ships and Sailing Routes in Maritime Trade around Europe 1300–1600,” in *The Routledge Handbook of Maritime Trade around Europe 1300–1600*, ed. Wim Blockmans, Mikhail Krom, and Justyna Wubs-Mrozewicz (Abingdon: Routledge, 2017), 17–35; José M. Malhão Pereira, “Roteiros portugueses, séculos XVI a XVIII: Sua gênese e influência no estudo da hidrografia, da meteorologia e do magnetismo terrestre” (PhD diss., University of Lisbon, 2018); Charles H. Cotter, “A Brief History of Sailing Directions,” *The Journal of Navigation* 36, no. 2 (1983): 249–261.

transmission (primarily oral) from Greek, Latin, and Arab practices merged into the genre of documents known as *portolani*. These sailing directions mostly indicated a route from one port to another, marking distances, landmarks, and warnings against dangers such as rocks and sandbanks. Although they were mainly developed as low-priced and easily acquired items shared among merchants and their pilots, the genre went beyond its original production niche during the fifteenth century, and some texts came to be printed and published in more generalist nautical books.³⁸ Addressing several developments in nautical technology, especially the magnetic compass, the *portolani* also built on progress made by Iberian cosmographers and pilots. Suitable for the predominantly coastal navigation needs of the Mediterranean, late fifteenth-century *portolani* did not provide information on latitudes or tides and their variations.³⁹

In Northern Europe, likewise building on centuries of oral transmission, several genres of written sailing directions coalesced. By the mid-fifteenth century, their most widespread form had its origins in the accumulated knowledge of seafarers who sailed the great cogs through the many routes between the Baltic and the Bay of Biscay via the North Sea and the English Channel. Unlike the *portolani*, written mainly in the Italian languages, these northern navigational instructions circulated in both Low German (*See-buchen*), the diverse languages of the Dutch/Flemish context (*leeskaarten*), French (*routiers*), and English (*rutters*).⁴⁰ In contrast to the *portolani*, they provided precise indications on tidal variations, which were extremely important for navigation among the many shallows and sandbanks existing between Normandy and the Baltic.⁴¹

The Iberian tradition (appearing in the fifteenth century and at first predominantly Portuguese) was based on the knowledge circulating in both of these worlds. The experience gradually acquired by Portuguese mariners exploring the African coast can be associated with advances in astronomy, mathematics, shipbuilding techniques, and the production of nautical instruments.⁴² These in turn influenced the development of a new type of rutter. Portuguese oceanic rutters incorporated increasingly precise latitude measurements, distances, and depths. During the fifteenth

38 Cotter, "A Brief History of Sailing Directions," 249–261.

39 Malhão Pereira, *Roteiros portugueses*.

40 Unger, "Ships and Sailing Routes in Maritime Trade around Europe 1300–1600," 17–35.

41 Yftinus T. Popta, Christer L. Westerdahl, and Brad G. Duncan, "Maritime Culture in the Netherlands: Accessing the Late Medieval Maritime Cultural Landscapes of the Northeastern Zuiderzee," *International Journal of Nautical Archaeology* 48, no. 1 (2019): 172–188.

42 Leitão, "All Aboard!" 113–132.

century, they began to include augmented information about streams, tides, natural elements, and the inhabitants of the explored lands. In the early sixteenth century, as Atlantic navigation proceeded, advice on covering long distances across the open ocean, associated navigational guidance, and comments related to trade likewise appeared in Portuguese rutters.⁴³

By 1500, this new genre of sailing directions, the *roteiro*, had attained some clearly defined parameters. Initially, the type of knowledge they produced probably only came from practitioners with special training, such as pilots, cartographers, and cosmographers. But the rapid development of imperial circuits triggered wide-ranging transformations in various social structures, including those related to navigational knowledge production, whether theoretical or practical. As a consequence, existing hierarchies of knowledge were restructured, and the social role of knowledge producers was profoundly changed. Just as pilots, shipbuilders, and artisans making nautical instruments became progressively more important, the ability to produce oceanic rutters, bringing together diverse bodies of knowledge, also grew essential. Throughout the sixteenth century, such agents (and the knowledge they produced) circulated across Europe, particularly within the domains of the Spanish crown. Over time, the model developed by the Portuguese was adopted and adapted by rival nations and, by the mid-sixteenth century, this standard structure for rutter-writing became the most widespread across Europe.⁴⁴ The diffusion, exchange, and remaking of knowledge fostered by navigation was from the outset significant in the Iberian Peninsula, and would become particularly intense after the union of the Iberian crowns in 1580.

5.3. Nautical Rutters and the Economic Circuits of a Composite Empire

The process through which a global circulation of individuals, resources, and goods materialized was crucial to the cultivation of early modern knowledge societies. The agents of this transformation often operated within the many informal networks that intersected (or overlapped) with contemporary administrative, military, educational, and religious institutions. Insofar as the Iberian Union affected these structures, it is now worth pausing to consider its impact in slightly greater detail.

43 Malhão Pereira, *Roteiros portugueses*, 50–105.

44 Malhão Pereira, *Roteiros portugueses*, 50–105.

Like that of other early modern political conglomerates, the establishment of the empire ruled by the Habsburgs from 1580 onwards followed the basic principles of what John H. Elliott has termed “composite monarchies.” From an institutional point of view, both Iberian crowns largely preserved their administrative organizations’ autonomy.⁴⁵ From a purely formal point of view, this implied, among other consequences, that the Portuguese could not participate directly in Castile’s trade with America, while the Spanish were not allowed to deal in spices and other Asian products. Although subjects of the same monarch, a Castilian immigrant in, say, Bahia, or a Portuguese immigrant in Buenos Aires were considered as foreign as if they had been of Austrian, Flemish, or Genoese origin. The same separation was maintained in the supervision of overseas affairs. The jurisdictions of the Consejo de las Indias (Spain) and the Casa da Índia (Portugal) remained entirely distinct. The same went for the ecclesiastical structures of the secular clergy, the Inquisition, and the distribution of military expenditures.⁴⁶

However, understanding the entanglement of the Iberian empires and the genesis of their shared knowledge society requires considering, first and foremost, the activities of social networks and informal institutions. In practical terms, it was not always possible for regulatory institutions to make a precise distinction between subjects of one or another kingdom.⁴⁷ Many families, through marriage, godparenting, and other forms of affiliation, contributed actively to the movement of people, property, and resources between the most remote reaches of the empire. This pattern of interchange occurred across the Habsburg Empire, although it was more intense between the Portuguese and the Castilians.⁴⁸ Family, patronage, and clientele networks were often strengthened by their association with trade networks. Participants in these networks often maintained representatives in different imperial cities, promoting the circulation of goods, capital, and the knowledge tied to them.⁴⁹ This went hand-in-hand with the expansion of Portuguese trade in Asia and the consolidation of Brazil as a hub for resource extraction and immigration.

On the Spanish side, starting from 1560, there was a remarkable rise in the flow of American silver (through the Caribbean route and the Manila galleon), mainly due to the decline of Guinean gold shipments. By the early

45 John H. Elliott, “A Europe of Composite Monarchies,” *Past & Present* 137 (1992): 48–71.

46 Casalilla, *Os impérios ibéricos*, 130–160.

47 Tamar Herzog, *Frontiers of Possession* (Cambridge: Harvard University Press, 2015).

48 As shown by Herzog, *Frontiers of Possession*.

49 Ribeiro, *Early Modern Trading Networks*, 100–112.

seventeenth century, American silver was transferred to Asia to pay for the luxury products that arrived via Lisbon. These were distributed across the empire by Italian banking families, and linked to the financing of expanded sugar cane plantation in Brazil and a growing slave market on the African coast. This circuit was completed with the trade of Northern European products and the insurance and credit networks that funded most long-distance oceanic voyages, both Portuguese and Spanish.⁵⁰

This economic model depended largely on the capacity to transfer resources to elites in the form of privileges. Whether in Europe or in the colonies, from the lower nobility to the urban bourgeoisie and the wealthy peasantry, diverse sectors of both Iberian societies devoted significant energy to achieving a better placement within the system.⁵¹ A significant proportion of this effort was directed at the training and education of members of extended family communities. From the mid-1570s, there was a rise in the number of individuals from the aristocracy, mercantile, and even artisan classes heading to universities and other types of educational institutions, a trend which spread across the Iberian Peninsula. A considerable part of this movement was aimed at maritime and military careers, which absorbed large volumes of surplus capital and provided an efficient pressure valve for the tensions that resulted from distributional conflicts within family networks.

In order to make the whole system work, authorities in Lisbon and especially in Madrid demanded that the transmission of information and knowledge be as fast, efficient, and complete as possible. Knowledge became a primary tradable good, and its production—by the agents spread throughout the empire—came as a direct result of the massive resources families invested in the training of individuals, and the establishment of networks. As a commodity, knowledge therefore fed the economic reproduction of clientelist and family-based networks. In other words, the production and circulation of knowledge (and the increasing efficiency of commercial networks and credit mechanisms) sustained the imperial administration's overwhelming appetite for reliable information about the territories under its control. This was particularly important for an empire with extensive communication chains, like those of the monsoon-regulated Indian trade or the annual Manila galleons.⁵²

50 C. Marsilio, "The Genoese and Portuguese Financial Operators' Control of the Spanish Silver Market (1627–1657)," *The Journal of European Economic History* 41, no. 3 (2012): 69; James C. Boyajian, *Portuguese Bankers at the Court of Spain, 1626–1650* (New Brunswick: Rutgers University Press, 1983).

51 Casalilla, *Os impérios ibéricos*, 65–85.

52 Bracht, *Ao ritmo das monções*, 15–25 and Casalilla, *Os impérios ibéricos*, 65–85.

It is worth considering what sort of knowledge was most vital to the imperial enterprise. In the first place, knowledge for expanding and increasing the efficiency of long-distance voyages was crucial. This was generated by cosmographers, astronomers, mathematicians, and cartographers acting in a symbiotic relationship with highly specialized craftsmen, such as nautical instrument makers, pilots, and shipbuilders.⁵³ The appearance of such entanglements is among the fundamental aspects of the emergence of a knowledge society. Even if the production of a given body of knowledge was initially confined to a circumscribed milieu, their interactions outside their niche would transmit this productive capacity across society. The same process occurred in the military, where geographical knowledge was critical, and in the mercantile sector, which demanded knowledge produced in fields as diverse as navigation, law, diplomacy, and natural philosophy.⁵⁴ As a consequence, Portuguese rutters evolved from technical documents (mid-fifteenth century) into comprehensive analytical texts (sixteenth century).

Most of the Iberian rutters written after Duarte Pacheco Pereira's *Esmeraldo de situ orbis* (1505) incorporated knowledge produced in almost all of the fields just listed.⁵⁵ Their basic mandate was the collecting, organizing, and interpreting of data on sailing conditions and geographical information (which assisted cartographers in drafting accurate charts). But early modern rutters surpassed this requirement, embracing descriptions of the natural world, such as timber reserves and marine animal communities. Finally, they served as repositories of accumulated knowledge about people and their traditions, laws, and political and social organization.

As in other fields of knowledge, the ability to produce rutters transcended its initial ambit—pilots and cosmographers—and became shared by several other groups of learned individuals. Members of the administrative elite, the military, merchants, and adventurers (sometimes all in the same person) wrote rutters and sought to integrate them into economic reproduction processes, in the hope of expanding their networks of influence or even directly obtaining benefits or commercial privileges from the crown. It can be stated safely that the early modern Iberian social legitimation economy was likewise a form of knowledge economy. Throughout the sixteenth century, the production of rutters gained speed in all European nations participating in the maritime expansion. Sixteenth-century Iberian rutters

53 Leitão, "All Aboard!" 131–132.

54 Casalilla, *Os impérios ibéricos*, 90–93.

55 As discussed by Malhão Pereira, *Roteiros portugueses*.

covered virtually all known sailing routes. Often in manuscript, although with a growing share of printed works, complete rutters or fragments circulated by the thousands among seafarers, merchants, and the empire's administrative elite.

5.4. Rutters as the Critical Element in the Emergence of Knowledge Societies

To summarize, from the mid-sixteenth century onwards, a growing number of individuals mastered the knowledge necessary to produce rutters, at least in their basic configuration. Additionally, rutters came to serve broader purposes than merely guiding navigation. Due to their analytical character and wide circulation among learned European communities, rutters may have operated as scaffolding, transferring to different mental models the knowledge produced and gathered during sea voyages.⁵⁶ It seems plausible that the information about natural phenomena, environments, and peoples circulating via rutters triggered structural changes in other areas of inquiry as well.

Thus, a rutter can be understood as a technical document, valid for navigation or the production of nautical charts and maps, but also as a mental model, a specific way of reasoning and ordering knowledge about a given geographical area. Many early modern authors deliberately gave their texts the form of a rutter, which may indicate the preference of the rutter genre and its style of reasoning among those involved in long-distance voyages. The basic rutter invariably contained a narrative following a linear route, usually coastal, and data about the most important landmarks. Along the route, information about latitudes, distances, coastal profiles, and descriptions of harbors, water sources, hunting and fishing grounds, and timber reserves are given. As such texts were for more than guiding navigation; discussion of the conditions for establishing settlements could be added, often with detailed climate and soil analyses. Comments on local peoples are frequently encountered, as are strategic analyses regarding the defense of specific points on the coast (usually accompanied by reports on whether or not vessels from rival nations were present). The rutter

⁵⁶ The concept of "scaffolding structure" applied to the study of the history of transition between different mental models was proposed by Jürgen Renn, in adaptation of the theory of mental model reasoning developed by Philip Johnson-Laird and Ruth M. J. Byrne: Jürgen Renn, "From the History of Science to the History of Knowledge – and Back."

genre's basic structure allowed for knowledge of a political, economic, geographical, or natural philosophical nature. In taking on such topics, a rutter could address individuals ashore—be they patrons, politicians, or cartographers—impacting the granting of crucial resources and benefits within the distributional conflicts of imperial economic policy. Some of the most emblematic documents of this type were produced during the second half of the sixteenth century. The three documents to be analyzed in the next sections of this chapter are archetypical examples. Produced by non-professionals (that is, those unschooled in the trades of pilot, cartographer, or cosmographer), these texts are of uneven utility in navigation. In fact, it is possible that they were not even designed for such use at all.

5.5. Pero Magalhães de Gândavo

Pero Magalhães de Gândavo was born in Braga around 1540, into a family of Flemish extraction. His name is presumed to be derived from *Gantois*, a French designation for natives of Gant in the Low Countries. Historical records indicate that Gândavo owned a school in northern Portugal (where he taught Latin) and that he was appointed copyist of the royal archives at the Torre do Tombo at the end of Queen Catherine's regency (1557–1562).⁵⁷ It was during this period that Gândavo probably started writing his rutter-styled work entitled *Tratado da Terra do Brasil*. The work was undoubtedly finished before 1572, as is clear from the evidence in the text.⁵⁸ The original manuscripts have been lost, and there are only six known copies: two from the nineteenth century, one from the eighteenth century, and four others made in the seventeenth century.⁵⁹ These sources reveal that Gândavo offered his work to King Sebastião and his regents, Catherine and Cardinal Henrique.

Gândavo likely arrived in Brazil during the government of Mem de Sá between 1570 and 1572, and there is strong evidence suggesting that the *Tratado* was not based on the author's personal experience but rather on a

57 Lisbon, Arquivo Nacional da Torre do Tombo, Chancelaria de D. Sebastião e D. Henrique, liv. 37.

58 The most important evidence is that Gândavo did not mention the split of Brazil's administration between two governors, one in Bahia and the other in Rio de Janeiro, which took place in 1572.

59 Alexandre José Barbosa da Costa, "Das coisas maravilhosas e bestiais do Brasil: Um estudo sobre o gênero histórico em Pero de Magalhães de Gandavo" (PhD diss., Universidade de São Paulo, 2017).

selection of materials obtained from varied sources. Although Gândavo left no indication of these sources, it is possible to infer the type of reading from which literate individuals could obtain such information. Oral transmission aside, a range of written material about the New World circulated among the learned circles of Portugal and Spain. Some of these texts were travel accounts, logbooks, and rutters. Frequently handwritten, rutters of the Brazilian coast became more numerous from 1530 onwards, when Martim Afonso de Sousa completed an expedition of colonization, and Pero Lopes de Sousa composed his travel diary and rutter.⁶⁰ Between the 1540s and 1560s, the presence of European agents on the Brazilian coast became increasingly frequent, a trend bolstered by the arrival of the Society of Jesus in 1549. Rutters and written reports often passed through the hands of the realm's highest dignitaries, and even those of the monarch himself. Many of these documents were sent to the royal archives of Torre do Tombo, where the most important information on the kingdom's administration and overseas possessions was kept.

Gândavo's *Tratado* is a rutter in the broader sense. As a description of the Brazilian coast, it duly indicates the distances, latitudes, and navigational conditions of some bays and river mouths, but it was not a text conceived to facilitate navigation. It consists of two parts: the first dealing with the coast, and the second combining elements of natural philosophy and political discourse. It can thus be characterized as a descriptive and analytical work on geographical, natural, economic, and anthropological aspects of the territories along the coast between the captaincies of Pernambuco and São Vicente. The rutter-like structure is, in this case, a framework, allowing the author to fashion a comprehensive account of the Portuguese territories in South America. With its detailed discussion of flora and fauna, climatic conditions, and the habits and traditions of the indigenous peoples, Gândavo's *Tratado* is a complete guide to the conditions under which the colonization of the Brazilian coast was developing.⁶¹

At the end of the sixteenth century, this particular kind of text was of great strategic interest. Around 1570, the Spanish King Philip II (1527–1598) commissioned the Neapolitan cosmographer Giovanni Battista Gesio (?–1580) to secretly deliver a set of Portuguese manuscripts to Spain. The main objective

60 For a comprehensive accounting of sixteenth-century Portuguese rutters see Luana Giurgevich,

"Roteiros portugueses dos séculos XV e XVI (Manuscritos)," *RUTTER Technical Notes Series* 7, no. 1 (April 30, 2021): 52, <https://doi.org/10.6084/m9.figshare.14529084>, and chapter 1 of this volume.

61 Gândavo, *Tratado da Terra do Brasil*.

of this order was to gather information in support of the Spanish claims to the Moluccas.⁶² In 1573, Philip received a list of the manuscripts copied, among which featured several rutters, such as the *Esmeraldo de situ orbis* and a Castilian translation of Gândavo's *Tratado*. These bootlegged manuscripts ultimately became part of the Escorial library collection.⁶³ Gesio, who had accompanied Philip II's ambassador Juan de Borja (1533–1606) during his stay in Portugal, made good use of the strategic information he had amassed. Some years later, in 1578, he wrote the king six letters concerning Portuguese affairs, with intelligence on the defensive capacities of fortifications on the African coast, and advice on possible future conquests.⁶⁴

In addition to details regarding coastal sailing conditions and the location of villages, towns, and defensive positions, there was great interest in the knowledge being produced in the field of natural philosophy. Gândavo's text was, in this sense as well, a valuable document. For example, in locating the captaincy of Ilhéus, the *Tratado*, displaying all the characteristics of a typical rutter, states:

The captaincy of Ilhéus is thirty leagues from Bahia de Todos os Santos, at fourteen degrees and two thirds; it belongs to Francisco Giraldes, who has a captain loyal to him there. There may be two hundred residents there. It has a river where the ships come in ...⁶⁵

The text goes on to describe navigation through the entrance of the Cachoeira River and the dimensions of its harbor, and continues inland until reaching a large lagoon that “has an infinite number of large and small fish.”⁶⁶ What follows is a reconfiguration of knowledge, in which several different accounts of an animal (until lately unknown in Europe) were processed and framed according to the natural philosophical mental model characteristic of the Renaissance.⁶⁷ Through the recognition of sympathies and antipathies,

62 Ricardo Padrón, *The Indies of the Setting Sun: How Early Modern Spain Mapped the Far East as the Transpacific West* (Chicago: University of Chicago Press, 2020).

63 Padrón, *The Indies of the Setting Sun*.

64 Real Biblioteca del Monasterio de San Lorenzo de El Escorial: Discurso di Gio. Batt. Gesio, Mathematico di sua Mta. Catholica sopra la successione del Regno de Portugallo (registro nro. 2051).

65 “Capitania dos ilhéus está a trinta léguas da Bahia de todos os Santos em quatorze graus e dous terços; é de Francisco Giraldes, na qual tem posto capitão de sua mão. pode haver nela duzentos vizinhos. tem um rio onde os navios entram ...,” Gândavo, *Tratado da Terra do Brasil*, 40.

66 Gândavo, *Tratado da Terra do Brasil*, 40.

67 As discussed in Michel Foucault, *The Order of Things: An Archaeology of the Human Sciences* (London: Routledge, 1994).

approximations and emulations, Gândavo provided one of the first analytical descriptions of a manatee:

Many cow-fish breed there, which have a snout like that of an ox's and two stumps, like arms, with which they swim; they have no scales or other fish-like features except their tails. They are killed with harpoons, and are so fat and large that some weigh thirty, forty *arrobas*. It is a very tasty fish and looks just like meat and so has the taste of it; roasted it looks like pork or venison loin, it is boiled with cabbage, and stewed like meat, and no one who eats it regards it as fish, unless they know it first. The females have two breasts through which they suckle their young; they are raised on milk (which is not found in any other fish); there are also some of these in some bays and rivers along this coast, and although they are raised in the sea, they usually drink fresh water.⁶⁸

Although we cannot know exactly which accounts formed the basis of Gândavo's analysis, there is no doubt that this knowledge about the natural world flowed in profusion between the New World and Europe. Examples abound, such as a description of the same animal made by the Jesuit priest José de Anchieta (1534–1597), sent in a 1560 letter to his superiors in the Society of Jesus. According to Anchieta's account, the animal the natives called *iguaraguá* was:

In size it is larger than an ox, it is covered with hard skin, similar in color to that of the elephant. It has in its chest a kind of wings, with which it can swim, below them are the teats with which it feeds its young. The head is in everything similar to that of the ox. It is excellent to eat in such way that it is hard to say if it should be considered fish or meat.⁶⁹

68 "Criam-se nela muitos peixes-bois, os quais têm o focinho como o de boi e dois cotos com que nadam à maneira de braços; não têm nenhuma escama nem outra feição de peixe senão o rabo. Matam-nos com arpões, são tão gordos e tamanhos que alguns pesam trinta, quarenta arrobas. É um peixe muito saboroso e totalmente parece carne e assim tem o gosto dela; assado parece lombo de porco ou de veado, coze-se com couves, e guisa-se como carne, nem pessoa alguma o come que o tenha por peixe, salvo se o conhecer primeiro. As fêmeas têm duas mamas pelas quais mamam os filhos, criam-se com leite (cousa que se não acha noutro peixe algum): também há destes em algumas baías e rios desta costa e posto que se criem no mar costumam beber água doce," Gândavo, *Tratado da Terra do Brasil*, 40.

69 "Em tamanho, excede a um boi, cobre-se com sua dura pelle, semelhante pela côr á do elephante; tem no peito duas espécies de azas, com as quaes pôde nadar, debaixo das quaes crescem as tetas, onde cria os filhos, a cabeça é semelhante em tudo á do boi. Para comer, é excellente, de modo que se não pôde affirmar se deve ser considerado peixe, ou carne," José de

This kind of knowledge about nature was systematically produced by agents spread across different parts of the globe. By framing it in the structure of a rutter, Gândavo took it out of its micro-context, connecting it to a narrative that aimed to analyze, comprehensively and articulately, a portion of the coast that stretched between the equator and the Tropic of Capricorn. Like the manatee, other elements of nature were geographically situated along this route, allowing his readers a bird's eye view of the South American coast in all its aspects. Among Portuguese authors contemporary to Gândavo, this rutter-type structure seems to have been considered particularly appropriate for articulating such a diverse body of knowledge.

The nascent Iberian knowledge societies notably retained the economic reproduction models characteristic of the *ancien régime*. Legitimation was built around the primacy of the crown in the distribution of privileges, positions, perks, or sinecures, and knowledge became an essential currency and engine of social mobility. A few years after having dedicated his *Tratado* to the young King Sebastião and his regents, Gândavo was appointed treasury officer of the captaincy of Bahia, then headquarters of the general government of Brazil. After returning to Portugal, he published the *História da Província Santa Cruz*, printed in Lisbon in 1576 and dedicated to Lioniz Pereira, third count of Feira. This publication, approved by the Inquisition and sponsored by a member of the upper nobility, is proof of Gândavo's insertion into imperial economic circuits.⁷⁰

Shortly after Gândavo's death in 1580, the dynastic crisis into which Portugal plunged since King Sebastião's death in 1578 resulted in the union of the Iberian crowns under King Philip II of Spain (who became Philip I of Portugal). The union with Spain did not diminish the importance of knowledge production as a means of economic reproduction. While attempting to rule a multifaceted empire that stretched from the Philippines to Mexico, across the Indian Ocean and the South Atlantic, the crown depended entirely on the production and circulation of knowledge to direct its human and economic resources properly. This dependency provided an excellent incentive for individuals from diverse social and intellectual backgrounds to view knowledge production as a way of taking advantage of the imperial distributive conflict. Such was the case of Gabriel Soares de Sousa, to whose work I now turn.

Anchieta, *As coisas naturais de São Vicente*, Carta ao General P. Diogo Laínes, Roma, São Vicente, 31 de maio de 1560, in *Minhas cartas por José de Anchieta* (São Paulo: Associação Comercial de São Paulo, 2004), 26–55.

70 Da Costa, "Das coisas maravilhosas e bestiais do Brasil," 64–76.

5.6. Gabriel Soares de Sousa

Produced between 1580 and 1587 in Madrid, Gabriel Soares de Sousa's *Tratado descritivo do Brasil* shares many of the characteristics of Gândavo's work. As with the latter, little information about Sousa's life is available. Probably from the low-ranking nobility, Sousa was born in Portugal around 1540, and is believed to have emigrated to Brazil around 1560, settling in Bahia, where he lived for the next seventeen years. By 1587 he was in Madrid, where he offered his manuscript to Cristóvão de Moura (1538–1613), an influential Portuguese nobleman long established at the Spanish court. This decision was nothing if not fortuitous; Moura's ascendancy over the Portuguese nobility was such that he was twice named viceroy of Portugal. At the center of intricate patron-client networks, Moura was a crucial liaison between the Portuguese nobility, the crown, and imperial institutions. By means of his engagement with various informal networks and the power this won him, Cristóvão became essential to King Philip II in the administration of Portuguese affairs and the management of his unwieldy composite empire.

The manuscript Sousa presented to Cristóvão was divided into two parts. The first part, "Roteiro geral com largas informações de toda a costa do Brasil," (General Rutter With Wide Information on All the Coast of Brazil) is a rutter describing the coast of South America from the proximities of the Amazon River mouth to the estuary of the Rio de la Plata.

The second, "Memorial e declaração das grandezas da Bahia de Todos os Santos, de sua fertilidade e das notáveis partes que tem," (Memorial and Account of the Greatness of the Bahia de Todos os Santos, its Fertility, and the Notable Features it Possesses). is a comprehensive descriptive and analytical work about the captaincy of Bahia. Sousa's "Memorial" includes knowledge regarding diverse environmental, botanical, hydrographical, and anthropological topics, and remains one of the most important documents ever produced about sixteenth-century Brazil.

The two texts are complementary: while the first offers an aerial view of the coast of South America, the second zooms in to closely examine the wealthiest and most developed Portuguese colony in the Americas. Both draw upon multiple bodies of knowledge. Like Gândavo's text, although more precisely, Sousa's rutter indicates latitudes and distances and provides data on depths, rocks, coastal features, and sandbanks—it is suitable for sailing. Given the ample non-navigational content Sousa includes, however, the rutter genre seems to be employed as a tool to construct knowledge in other fields as well.

In many ways, Sousa's rutter of the Brazilian coast bears a great resemblance to its counterpart by Gândavo. Both were compiled from information obtained indirectly, whether from oral accounts or the manuscript sources that circulated widely in the Iberian Peninsula at the time. Unlike Gândavo's rutter, though, Sousa's text is replete with references to these sources.

For example, when writing about the mouth of the Amazon River, Sousa admitted to having drawn on reports from Francisco Orellana's voyage of 1542 (although the exact sources he consulted are not specified). Portuguese explorers and pilots are also mentioned, as is the case of a certain Luís de Melo, the son of the *alcalde-mor* of Elvas, who was sailing along the coast when he got lost in the shallows of the Amazon River and supposedly found Spanish soldiers—deserters from Orellana's expedition—living among the local people.

More illuminating with regard to the materials on which Sousa relied to write his rutter is the passage in which he describes the estuary of the Maranhão river:

This river of Maranhão has at its mouth—between the banks and inwards from them—an island called “das Vacas,” which is three leagues long, where Aires da Cunha was when he was lost with his armada in these waters;

And here on this island were also the sons of João de Barros and there they had a settlement, when they were also lost in the shallows of this river, where they made peace with the Tapuia people, who have populated part of this coast, and up this river, where they sent to buy provisions and other things for their sustenance.

Through this river entered Bastião Marinho, a coastal pilot, with a small caravel, and he went up it for about twenty leagues, where he found many islands full of trees and their land steep, with a passable depth; and many branches into which many rivers flow, joining this one. He stated that all the land was lush, full of forest, and inhabited by people, as were the islands. Into this river flows the Pindaré, which comes from very far away.⁷¹

71 “Tem este rio do Maranhão na boca—entre ponta e ponta delas para dentro—uma ilha que se chama das Vacas, que será de três léguas, onde esteve Aires da Cunha quando se perdeu com sua armada nestes baixos; e aqui nessa ilha estiveram também os filhos de João de Barros e aí tiveram povoado, quando também se perderam nos baixos deste rio, onde fizeram pazes com o gentio tapuia, que tem povoado parte desta costa, e por este rio acima, onde mandavam resgatar mantimentos e outras coisas para remédio de sua manutenção. Por este rio entrou um Bastião Marinho, piloto da costa, com um caravelão, e foi por ele acima algumas vinte léguas, onde achou muitas ilhas cheias de arvoredo e a terra delas alcantilada com sofrível fundo; e muitos braços em que entram muitos rios que se metem neste, o qual afirmou ser toda a terra

Sousa had access to the information gathered by pilots and other professional seafarers, and their rutters or logbooks. Throughout his text, Sousa mentions several other pilots, cosmographers, and explorers from whom he acquired the data needed to compose a rutter that described about eight thousand kilometers of coastline in great detail. One can infer that alongside the classics (the works of Pliny and Ptolemy, for instance), rutters and logbooks were recurrent reading for Sousa.

The knowledge Sousa transmitted responded to the crown's needs and interests, as in the passage relating the experience of a pilot named Nicolau Resende, who, while negotiating the shallows of the Jagoaripe River, witnessed immense palm forests stretching many miles inland. At the same time, Sousa's text references things like the marine fauna that could be found along the coast.

In the second half of his work, Sousa deliberately abandoned the rutter-like structure, switching to another style popular in the second half of the sixteenth century: the treatise. In this part, Sousa describes and analyzes the elements of the natural world, plants, and animals, and also addresses the human, geographical, and economic aspects of the region around the Bay of All Saints.

Sousa's text enjoyed wide circulation. According to Francisco Adolfo Varnhagen (1816–1868), a pioneer in the study of Sousa's rutter, several copies were made even before the end of the sixteenth century, and excerpts have been found in the manuscripts of other writers. An exhaustive study by Luana Giurgevich identified twenty-three copies produced in Portugal and Spain between the end of the sixteenth century and the first half of the seventeenth century.⁷²

By offering his manuscript to Cristóvão de Moura in the context of the legitimization economy of Iberian societies, Sousa sought to have more straightforward access to credit markets and clientelist networks in order to finance an expedition in search of supposed emerald deposits in the Brazilian hinterland. That is, the knowledge produced by Sousa became an asset to be exchanged within the economic reproduction mechanisms of the empire. Through the intervention of Cristóvão de Moura, Sousa obtained resources from multiple sources, including the crown itself. He probably died from a fever on the longed-for expedition, in the mountains of Chapada Diamantina, around 1592.

fresca, cheia de arvoredos e povoada de gentio, e as ilhas também. Neste rio entra o de Pindaré, que vem de muito longe." de Sousa, *Tratado descritivo do Brasil*, 76.

72 See Giurgevich, "Roteiros portugueses dos séculos XV e XVI (Manuscritos)," 97–101.

5.7. André Donelha

On November 7, 1625, André Donelha, a merchant and ship-owner operating in the Portuguese trading networks in Guinea, offered his *Descrição da Serra Leoa e dos Rios da Guiné e do Cabo Verde* to the governor general of the captaincy of Cape Verde, Francisco de Vasconcelos da Cunha. Donelha's origins are uncertain, although it is known that he was the son of an Italian merchant who settled in Cape Verde in the 1550s. In the 1570s and 1580s, he participated in military expeditions fighting the French and several local kingdoms threatening Portuguese commercial activities in the region. He established himself as a merchant on the island of Santiago, and traded with the inhabitants of the Guinea coast, exchanging European products for slaves and ivory. He was a contemporary of André Álvares e Almada, a prestigious mixed-race merchant (his father Portuguese, and mother Bantu), and author of the *Tratado breve dos rios de Guiné do Cabo-Verde* (1594), although in Donelha's text, there is no reference to this author or his work. Donelha's manuscript was included in the then-governor of Cape Verde's administrative archives and accompanied the governor when he was transferred to Angola.⁷³

Donelha's *Descrição* is a rutter, composed in the consolidated style of the genre, containing exhaustive data on navigation, latitudes, and distances and, above all, the variability of tides and winds (essential for safe passage through the dangerous shallows of Guinea). At its core, though, Donelha's manuscript is a diplomatic and commercial treatise. It deals with coastal and hinterland peoples in great detail, touching on the geographical boundaries between local kingdoms, their history and political structures, and cultural aspects. With this text, Donelha sought to determine the best way to establish commercial and diplomatic relations with the peoples with whom the Portuguese were in contact. With Donelha's *Descrição* in hand, colonial administrators could avoid (or mediate) conflicts, and would know precisely where and how to allocate human, economic, and military resources.

Conclusion

The three rutters outlined above share several characteristics. First, they were produced by individuals who were engaged in the colonial enterprise,

73 Avelino Teixeira da Mota, "Sobre o Autor," in André Donelha, *Descrição da Serra Leoa e dos Rios de Guiné do Cabo Verde* (1625): *An Account of Sierra Leone and the Rivers of Guinea of Cape Verde* (1625) (Lisboa: Junta de Investigações Científicas do Ultramar, 1977).

but who were not necessarily professional navigators, nor part of the learned circles of astronomers, cosmographers, and cartographers connected to maritime activities. Another point in common is that the knowledge presented in the three texts was built from heterogeneous sources, such as the rutters of Duarte Pacheco Pereira (1506) and Pedro de Sousa (1530). Additionally, the three authors made extensive use of the knowledge acquired through their informal networks (pilots, merchants, colonial authorities, and inhabitants of the regions described). In this way, they collected, organized, and analyzed knowledge produced dispersedly, whether over long distances or via individuals acting as hubs connecting disparate contexts.

Such knowledge could be exchanged along the typical reproductive pipelines of the *ancien régime* economies. For local or imperial authorities, it was strategic knowledge that could guide decision-making. In another sphere, individuals belonging to diverse groups (e.g., merchants, artisans, traders, and scholars) could use the knowledge available in these rutters to prospect business opportunities, regulate the credit market and maritime insurance, search for exotic new products, learn about medicinal drugs, or access information that could advance existing knowledge in other fields of inquiry.

Given their potential to promote the movement and reconfiguration of knowledge, and their connection to economic reproduction processes, rutters can be considered critical elements in the construction of early modern colonial empires. By percolating transversally among social strata and across a broad imperial network, rutters acted as links between worlds, a basis upon which significant changes in the structures of knowledge could be effected. Finally, since they were inserted, through the action of informal and self-organized networks, into economic replication chains ranging from the imperial administration to the mercantile communities operating in small territories, rutters were essential to the emergence of a knowledge society within the Iberian empires and, possibly, within early modern Europe more generally.

References

Primary Sources

- Anchieta, José de. *As coisas naturais de São Vicente*. Carta ao General P. Diogo Laínes. Roma. São Vicente, 31 de maio de 1560. In *Minhas Cartas por José de Anchieta*, 26–55. São Paulo: Associação Comercial de São Paulo, 2004.

- Donelha, André. *Descrição da Serra Leoa e dos Rios de Guiné do Cabo Verde* (1625): *An Account of Sierra Leone and the Rivers of Guinea of Cape Verde* (1625). Lisboa: Junta de Investigações Científicas do Ultramar, 1977.
- Gândavo, Pero de Magalhães. *Tratado da Terra do Brasil: História da Província Santa Cruz, a que vulgarmente chamamos Brasil*. Brasília: Senado Federal, Conselho Editorial, 2008.
- Lisbon, Arquivo Nacional da Torre do Tombo, Chancelaria de D. Sebastião e D. Henrique, liv. 37.
- Real Biblioteca del Monasterio de San Lorenzo de El Escorial, Discurso di Gio. Batt. Gesio, Mathematico di sua Mta. Catholica sopra la successione del Regno de Portugall, Registro nro. 2051.
- Sousa, Gabriel Soares de. *Tratado descritivo do Brasil em 1587*, edited by Francisco Adolfo de Varnhagen. São Paulo: Companhia Editora Nacional, Série Brasileira, 1971.

Secondary Sources

- Acemoglu, Daron, Simon Johnson, and James Robinson. "The Rise of Europe: Atlantic Trade, Institutional Change, and Economic Growth." *American Economic Review* 95, no. 3 (2005): 546–579.
- Bell, Daniel. *Post-Industrial Society*. London: Routledge, 2020.
- Boyajian, James C. *Portuguese Bankers at the Court of Spain, 1626–1650*. New Brunswick: Rutgers University Press, 1983.
- Bracht, Fabiano. *Ao ritmo das monções: Medicina, farmácia, história natural e produção de conhecimento na Índia portuguesa no século XVIII*. Porto: Edições Afrontamento, 2017.
- Brilkman, Kajsa. "The Circulation of Knowledge in Translations and Compilations." In *Circulation of Knowledge: Explorations in the History of Knowledge*, edited by Johan Östling, Erling Sandm, David Larsson Heidenblad, Anna Nilsson Hammar, and Kari Nordberg. Lund: Nordic Academic Press, 2018.
- Burke, Peter. *What Is the History of Knowledge?* Cambridge: Polity Press, 2016.
- Cañizares-Esguerra, Jorge. "Iberian Science in the Renaissance: Ignored How Much Longer?" *Perspectives on Science* 12, no. 1 (2004): 86–124.
- Casalilla, Bartolomé Yun. *Os impérios ibéricos e a globalização da Europa (séculos XV a XVII)*. Lisboa: Temas e Debates, 2021.
- Costa, Alexandre José Barbosa da. *Das coisas maravilhosas e bestiais do Brasil: Um estudo sobre o gênero histórico em Pero de Magalhães de Gândavo*. PhD diss., Universidade de São Paulo, 2017.
- Cotter, Charles H. "A Brief History of Sailing Directions." *The Journal of Navigation* 36, no. 2 (1983): 249–261.
- De Munck, Bert, and Antonella Romano. "Knowledge and the Early Modern City: An

- Introduction." In *Knowledge and the Early Modern City: A History of Entanglements*, edited by Bert De Munck and Antonella Romano (Abingdon: Routledge, 2019), 1–30.
- Drucker, Peter. *The Age of Discontinuity: Guidelines to Our Changing Society*. London: Routledge, 2017.
- Dupré, Sven, and Geert Somsen. "The History of Knowledge and the Future of Knowledge Societies." *Berichte zur Wissenschaftsgeschichte* 42, no. 2–3 (2019): 186–199.
- Elliott, John H. "A Europe of Composite Monarchies." *Past & Present* 137 (1992): 48–71.
- Foucault, Michel. *The Order of Things: An Archaeology of the Human Sciences*. London: Routledge, 1994.
- Giurgevich, Luana, "Roteiros portugueses dos séculos XV e XVI (Manuscritos)," *RUTTER Technical Notes Series* 7, no. 1 (April 30, 2021): 52, <https://doi.org/10.6084/m9.figshare.14529084>.
- Herzog, Tamar. *Frontiers of Possession*. Cambridge: Harvard University Press, 2015.
- Krohn, Wolfgang. "Knowledge Societies." In *International Encyclopedia of Social and Behavioral Sciences*, edited by James D. Wright, vol. 12, 8139–8143. Amsterdam: Elsevier, 2001.
- Leemans, Inger, and Anne Goldgar. *Early Modern Knowledge Societies as Affective Economies*. Abingdon: Routledge, 2020.
- Leitão, Henrique. "All Aboard! Science and Ship Culture in Sixteenth-Century Oceanic Voyages." *Early Science and Medicine* 21, no. 2–3 (2016): 113–132.
- Machlup, Fritz. *The Production and Distribution of Knowledge in the United States*. Princeton: Princeton University Press, 1962.
- Malhão Pereira, José M. "Roteiros portugueses, séculos XVI a XVIII: Sua gênese e influência no estudo da hidrografia, da meteorologia e do magnetismo terrestre." PhD diss., University of Lisbon, 2018.
- Margócsy, Dániel. *Commercial Visions: Science, Trade, and Visual Culture in the Dutch Golden Age*. Chicago: University of Chicago Press, 2014.
- Marsilio, C. "The Genoese and Portuguese Financial Operators' Control of the Spanish Silver Market (1627–1657)." *The Journal of European Economic History* 41, no. 3 (2012): 69–89.
- Östling, Johan, Erling Sandmo, David Larsson Heidenblad, Anna Nilsson Hammar, and Kari H. Nordberg, eds. *Circulation of Knowledge: Explorations in the History of Knowledge*. Lund: Nordic Academic Press, 2018.
- Padrón, Ricardo. *The Indies of the Setting Sun: How Early Modern Spain Mapped the Far East as the Transpacific West*. Chicago: University of Chicago Press, 2020.
- Popta, Yftinus T., Christer L. Westerdahl, and Brad G. Duncan. "Maritime Culture in the Netherlands: Accessing the Late Medieval Maritime Cultural Landscapes of the Northeastern Zuiderzee." *International Journal of Nautical Archaeology* 48, no. 1 (2019): 172–188.

- Pratt, Marie Louise. *Imperial Eyes: Travel Writing and Transculturation*. Abingdon: Routledge, 1992.
- Raj, Kapil. *Relocating Modern Science: Circulation and the Construction of Knowledge in South Asia and Europe, 1650–1900*. Basingstoke: Palgrave Macmillan, 2010.
- Renn, Jürgen. “From the History of Science to the History of Knowledge – and Back.” *Centaurus* 57, no. 1 (2015): 37–53.
- Ribeiro, Ana Sofia. *Early Modern Trading Networks in Europe: Cooperation and the Case of Simon Ruiz*. Abingdon: Routledge, 2017.
- Sánchez, Antonio, and Henrique Leitão. “La ciencia ibérica: ¿Aparte o parte de la ciencia moderna?” *Revista de Occidente* 433 (2017): 5–18.
- Secord, James A. “Knowledge in Transit.” *Isis* 95, no. 4 (2004): 654–672.
- Stehr, Nico. “Modern Societies as Knowledge Societies.” In *Handbook of Social Theory*, edited by George Ritzer and Barry Smart, 494–508. London: Sage Publications, 2003.
- Teixeira da Mota, Avelino. “Sobre o Autor.” In *Descrição da Serra Leoa e dos Rios de Guiné do Cabo Verde (1625): An Account of Sierra Leone and the Rivers of Guinea of Cape Verde (1625)*, by André Donelha. Lisboa: Junta de Investigações Científicas do Ultramar, 1977.
- Unger, Richard W. “Ships and Sailing Routes in Maritime Trade around Europe 1300–1600.” In *The Routledge Handbook of Maritime Trade around Europe 1300–1600*, edited by Wim Blockmans, Mikhail Krom, and Justyna Wubs-Mrozewicz, 17–35. Abingdon: Routledge, 2017.
- Unger, Roberto M. *Knowledge Economy*. London: Verso Books, 2019.
- Verburgt, Lucas M. “The History of Knowledge and the Future History of Ignorance.” *KNOW: A Journal on the Formation of Knowledge* 4, no. 1 (2020): 1–24.
- Wendt, Helge. *The Globalisation of Knowledge in the Iberian Colonial World*. Berlin: Max Planck Institute for the History of Science, 2017.
- White, Richard. *The Middle Ground: Indians, Empires, and Republics in the Great Lakes Region, 1650–1815*. Cambridge: Cambridge University Press, 2001.

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