The Economics of Straw and Reed in Fifteenth-Century Ostend and Nieuwpoort

Kristiaan Dillen

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Abstract

In the fifteenth century, communities along the Flemish coast purchased much more straw and reed than those inland. These dried grasses were essential commodities for managing the risks associated with the sea. Straw was crucial to strengthen the dikes and dunes, and reed was used in the lighthouses. The port cities Ostend and Nieuwpoort did not leave the market for straw and reed to chance, though they each addressed the purchase of these products in their own way. The fifteenth-century city accounts reveal increasing advances in management and purchasing strategies through the standardization and the formalization of market relationships. The increasing advances in accessing the market by Ostend and Nieuwpoort contributed to the resilience of these two urbanized coastal communities, making them less vulnerable, as they were able to use the presence of the sea to their advantage.

The preserved written sources from the late medieval coastal communities in Flanders mention straw and reed remarkably often. Straw derives from the stalks and foliage of domesticated agricultural crops, such as wheat, barley, and rye. Reed is a helophyte, a type of winter-hardy grass that grows above the water surface but with roots in the water. Like straw, reed can be stored for a long time in a dried state. Both straw and reed were used in individual households, in the many construction projects undertaken by the coastal communities, and as fuel. In Flanders, straw and reed were indigenous, so they did not have to be imported from afar, which largely protected these products

from stricter forms of trade regulation, such as the obligation to bring them to a certain marketplace or subject them to a toll. Seeing as the late medieval Flemish coastal area was a flat wetland where helophytes thrived, these grasses, especially reed, could also be a nuisance: uncontrolled proliferation could obstruct water drainage in the many canals and watercourses in the region[1]. Good water management was therefore essential to support the permanent presence of people.

Although straw and reed appear frequently in the historical sources, they have received relatively little attention from historians, neither in their research in agriculture nor in that of water management, ecology, urban space, or marine navigation. Agricultural historians have focused mainly on food grains, industrial crops, and techniques of agriculture intensification.[2] Extensive research has been conducted into the interplay of labor, land, and capital as production factors of Flanders' economy. Considerable attention centers on the ownership relationships and power structures in food production, as well as on the particular role of common-pool resources, which functioned as a credit and insurance system for smaller farmers.[3] Historians study and explain the survival strategies of both peasants and fishermen, one of which was to adopt a more intrusive, aggressive attitude towards the resources of nature and labor.[4]

Ecological historians study the relationship between the landscape, economy, and jurisdiction and display an increasing interest in natural history and biodiversity.[5] The role of peat has a more substantial body

1 Ferenc Zámolyi et al., 'Reed as building material – renaissance of vernacular', in: *International Symposium on Advanced Methods of Monitoring Reed Habitats* (Berlin 2011) 83.

2 E.g. Adriaan Verhulst, *Landschap en landbouw in middeleeuws Vlaanderen* (Brussel 1995). Jacques Mertens, *De laat-middeleeuwse landbouweconomie in enkele gemeenten van het Brugse platteland* (Brussel 1970). Paul Lindemans, *Geschiedenis van de landbouw in België*, vol. 1, 2 vols (Antwerpen 1952).

3 Erik Thoen, '"Social agrosystems" as an economic concept to explain regional differences. An essay taking the former county of Flanders as an example (Middle Ages-19th century)', in: Bas J.P. van Bavel and Peter Hoppenbrouwers (eds), *Landholding and land transfer in the North Sea area* (*late Middle Ages-19th century*) *Vol. 5, Corn* (Turnhout 2004) 47-48. Eric Vanhaute, 'Peasant frontiers and the enigma of peasant work', *Commodity Frontiers* 3 (2021) 52-53. Tim Soens and Maïka De Keyzer, 'From the resilience of commons to resilience through commons. The peasant way of buffering shocks and crises', *Continuity and Change* 37:1 (2022) 1-11.

4 Hanne Cottyn, Eric Vanhaute, and Esther Beeckaert, 'Peasant frontiers as a research strategy. Peasant resilience and the reproduction of common land rights', *Continuity and Change* 37:1 (2022) 43-68.

5 See for example: Thomas Van Goethem and Jan Luiten Van Zanden, 'Who is afraid of biodiversity? Proposal for a research agenda for environmental history', *Environment and History* 25:4 (2019) 613-647. Wim Blockmans, 'Peasants' voices in territorial politics', in: Claire Weeda, Robert Stein, and Louis Sicking (eds), *Communities, environment and regulation in the premodern world, Essays in the honour of Peter Hoppenbrouwers* (Turnhout 2022) 47-70.

of historiography than that of reed and straw.[6] The Flemish maritime landscape was, in several respects, a frontier that, due to its marginal nature, provided opportunities but also entailed major risks.[7] In the Low Countries, the perils associated with the maritime landscape are commonly studied as risk-management,[8] while the measures taken are analyzed as a resilience strategy.[9] The focus of such research is principally the water boards, the hydraulic infrastructure needed for water management, and the consequences of water management for the landscape and society.[10] Maritime historians, finally, mainly explore the history of ports, the system of outports in the Zwin harbor, and the many, often expensive projects initiated by the city of Bruges to ensure its accessibility from the sea.[11]

The strategies of the coastal communities to manage their relationship with the sea, along with the straw and reed used in this context, were aimed at achieving two intertwined but nevertheless distinct goals. In the first place, the communities tried to maintain themselves in the landscape by coping with the fickle, destructive violence of nature. In addition, the communities sought to increase opportunities for exploiting the sea in general and the coastal waters, in particular, by employing beacons to limit the navigational hazards of an otherwise wide and trackless space. The historical relationship

6 Beatrijs Augustyn, 'De turfwinnersdorpen Kieldrecht en Verrebroek in 1394. Twee stadia in de evolutie van een protoindustriële naar een agrarische produktiewijze', *Annalen van de Koninklijke oudheidkundige kring van het Land van Waas* LXXXVIII (1988) 241-256. Tim Soens, 'Het dossier Doel. Landschapshistorische reflecties rond het spanningsveld tussen polder en havenstad', in: Hilde Greefs and Ilja Van Damme (eds), *In behouden haven. Liber Amicorum Greta Devos. Reflecties over maritieme regio's* (Tielt 2009) 133-164. Iason Jongepier et al., 'The brown gold. A reappraisal of medieval peat marshes in northern Flanders (Belgium)', *Water History* 3 (2011) 76-93.

7 Richard C. Hoffmann, 'Frontier foods for late medieval consumers. Culture, economy, ecology', *Environment and History* 7:2 (2001) 131-167. David Abulafia, 'Seven types of ambiguity, c. 1100-c. 1500', in: David Abulafia and Nora Berend (eds), *Medieval frontiers. Concepts and practices* (Aldershot 2002) 1-34. Thomas Heebøll-Holm, *Ports, piracy, and maritime war. Piracy in the English Channel and the Atlantic, c. 1280 – c. 1330* (Leiden [etc.] 2013).

8 Mathias Tranchant, 'La "culture" du risque chez les populations usagères des mers et littoraux du Ponant (XIe-XVIe siècles). Première approche d'une histoire à construire', *Revue d'Histoire Maritime* 9 (2009) 9-45.

9 Soens and De Keyzer, 'From the resilience'.

10 Petra J.E.M. Van Dam, 'Ecological challenges, Technological innovations. The modernization of sluice building in Holland, 1300-1600', *Technology and Culture* 43:3 (2002) 500-520. Tim Soens, *De spade in de dijk? Waterbeheer en rurale samenleving in de Vlaamse kustvlakte 1280-1580* (Ghent 2009).

11 Jan Trachet et al., 'Turning back the tide. The Zwin debate in perspective. A historiographical review of the medieval port system northeast of Bruges', *Revue du Nord* 97 (2015) 305-321. Marc Ryckaert and André Vandewalle, 'De strijd voor het behoud van het Zwin', in: Valentin Vermeersch (ed.), *Brugge en de zee. Van Bryggia tot Zeebrugge* (Antwerp 1982) 53-70.

between humans and the landscape is the subject of ongoing scholarly debate in many disciplines. Historians sometimes call a landscape with a highly developed risk- and threat-management culture a "landscape of coping" and the conditional attitude enabling the communities to uphold themselves in that landscape "resilience".[12] In their collective measures and attitude, the maritime, seagoing communities along the late medieval Flemish coast strongly resembled other resilient communities, both in the coastal area and deeper inland. While their strategies certainly deserve a place in this ongoing debate among historians, scholars have largely overlooked the role of straw and reed.

In the historical analysis presented here, I demonstrate that the special attention paid to the straw and reed market distinguished the late medieval Flemish maritime communities from the parishes and towns located further inland. I argue that straw and reed were essential and indispensable for these communities, and that the communities did not leave the market for these grass-derived products to chance. At that market, different types of straw and reed were offered at different prices. This variety was determined by the type of grass, the quality, the used or unused status of the product, and the moment it was harvested. Supply and demand evolved over time. I show that the approach to this grass market matured from an ad hoc crisis mode to a more predictable one. The purchasing strategies involved could count on an increasing standardization of the market and greater formalization of acquisition. I explain that this evolution ran parallel to an optimization of urban financial management, and that the communities often made different choices, even though they had access to the same repertoire of raw materials they could use to satisfy an essential need. In what follows, I first provide an overview of the products central to this study. I describe what the straw and reed were used for and then elaborate on the measures taken by the coastal communities to ensure their adequate supply.

Straw and reed in the sources

The late medieval written sources include a wide spectrum of terms referring to grasses, helophytes, straw, and reed. The self-evident labels are *riede* (reed), *lissche* (water flag iris),[13] and the generic *garse* (grass),

12 Franz Mauelshagen, 'Flood disasters and political culture at the German North Sea coast. A long-term historical perspective', *Historical Social Research* 32:3 (2007) 133-144.

13 Bruges State Archives (next BSA), Watering Blankenberge, 333 (account 1407-1410).

with various spellings. Much more often than not, the terms do not refer to the plant itself but to its derivatives, such as *stroye* (straw), *deeckx* (thatch), or *gleye/gloye/gluye/gleu/glui* (the long, purified straw of wheat, rye, or oats).[14] These words enable the twenty-first century researcher to form an idea of the plants that served as raw materials, but we are unsure whether these plants' names refer to the same biological reality we know today. Iconographic sources can hardly help us with this problem. The lower panels of the Ghent Altarpiece, for example – a work of art that also has some natural-historical importance because the Van Eyck brothers added countless specific plants – fail us in that respect. Although the panels also show ferns, brambles, and dandelions, in addition to many garden plants,[15] recognizable grasses and reeds are not included. Matthias de Lobel's *Kruidtboeck* (herb book) from 1581 offers more guidance. In addition to all the plants mentioned above, 45 types of grass are described and, in some cases, also presented visually.[16] However, we do not always know for sure which types of grass produced the straw and reed mentioned in medieval sources, nor what shape they took. Only sporadically do the sources clarify from which grass the straw came, and we are completely in the dark about the reeds. Archaeological research in the fifteenth-century fishing village of Walraversijde, five kilometers west of Ostend, suggests elk sedge (*Cladium mariscus*, see figure 1) was used as a roofing material, while today this plant is quite rare in the Low Countries compared with the ubiquitous common reed (*Phragmatis australis*). The fishermen of Walraversijde probably used the material they found in the immediate vicinity, the dunes. In the similarly wet context of the Lower Scheldt polders, too, elk sedge seems to have been abundantly present alongside other sedge species, including the *Cyperaceae*.[17] However, since palynological research was only carried out to a limited extent in a Flemish late medieval wetland context and the identification of plants by their pollen is often only possible at the level of the order and not of the genus or species, no general conclusions can be drawn from these findings.[18]Regardless,

14 Soens, *De spade in de dijk?*, 160.

15 Kristof Van Assche, 'Planten bij Van Eyck', *Monumenten en Landschappen* 14:1 (1996) 8-25.

16 Matthias de Lobel and Christophe Plantin, *Kruydtboeck oft beschrijvinghe van allerleye ghewassen, kruyderen, hesteren ende gheboomten* (Antwerp 1581) V-31. Tim Soens, 'Resilient societies, vulnerable people. Coping with North Sea floods before 1800', *Past and Present* 241:1 (2018) 145.

17 Vanessa Gelorini et al., 'Palaeo-ecological study of a holocene sequence from the Deurganckdok at Doel (Lower Scheldt polders, Northern Belgium)', *Belgeo. Revue Belge de Géography* 3 (2006) 259.

18 Koen Deforce, 'Archeobotanisch onderzoek: pollen en sporen', in: Anton Ervynck and An Lentacker (eds), *Onderzoeksbalans archeologie in Vlaanderen, versie1, 11/12/2008. Natuurwetenschappelijk*

presumably all the grasses and helophytes mentioned in the sources are plants from families that, according to the most recent taxonomy, belong to the order *Poales*, an order of monocotyledons with seventeen families.[19]

The sources in which the straw and reed appear were produced by institutions willing to incur the costs for these products. First, the water boards were institutions responsible for the water management of the region, often supervised by the castellany and the count. The accounts of these boards and their so-called *neminghen* often mention reed, mainly as a nuisance that had to be removed in a timely manner.[20] A *nemingh* was a form of contract describing how a subcontractor was to maintain the infrastructure and waterways for an agreed period, price, and quality.

Straw and reed also appear in the accounts of the administrations of the coastal communities themselves, such as those of the Liberty of Bruges or the seigneury of Sint-Donatian. However, some of these communities had received city privileges and were, therefore, legal and administrative islands in the rural lowlands otherwise administered by the castellanies. Of the cities along the Flemish coast between Gravelines and Biervliet, Nieuwpoort and Ostend in particular produced sources in which grasses have a prominent place, which is why both cities receive the most attention in this analysis.[21]

For research into straw and reed, the city accounts of Nieuwpoort and Ostend are both a windfall and a setback. Both cities produced records documenting a long, uninterrupted series of purchases of these products throughout the fifteenth century. In the first quarter of that century, Ostend was very thorough in its reporting, including the month in which the product was purchased, which provides an insight into the annual cycle of purchases. A setback is that Nieuwpoort and Ostend, like many other Flemish cities, passed on certain management tasks to subcontractors, or so-called *offices*, who kept their own accounts. These

onderzoek en dateringen (Brussels 2020) 11-19. Dries Tys, 'The medieval embankment of coastal Flanders in context', in: Erik Thoen et al. (eds), *Landscapes or seascapes? The history of the coastal environment in the North Sea area reconsidered* (Turnhout 2013) 199-240.

19 The Angiosperm Phylogeny Group et al., 'An update of the angiosperm phylogeny group classification for the orders and families of flowering plants: APG IV', *Botanical Journal of the Linnean Society* 181:1 (2016) 1-20, https://doi.org/10.1111/boj.12385.

20 An example from the water board of Blankenberge: Bruges, OCMW Archief, Fonds Sint-Jans Hospital, Box 8, A24 a1.

21 Brussels General State Archives (next GSA), Chambre des Comptes (next CdC), Registers, 36701-36793 (Nieuwpoort 1391-1492) and 37239-37315 (Ostend 1403-1493).

Figure 1 The helophyte elk sedge as depicted in the Kruydtboeck of De Lobel and Plantin (Source: Matthias de Lobel and Christophe Plantin, Kruydtboeck oft beschrijvinghe van allerleye ghewassen, kruyderen, hesteren ende gheboomten *(Antwerp 1581) 20.)*

accounts were often supervised by the bench of aldermen but rarely preserved. In both Nieuwpoort and Ostend, part of the maintenance of the port was also executed via *taswerk* (defined projects) by subcontractors, who themselves were responsible for purchasing the raw materials they needed for the job.

Why straw and reed, and how much?

In medieval maritime communities, straw and reed were used as building materials and fuel.[22] Both Nieuwpoort and Ostend were looking for plants that had reached maturity and developed hard stems. The hardness and sturdiness of these grasses at this stage of life was of paramount importance. The dried vegetation took on a role in the urban space, but despite being in the same coastal area, this role was very dissimilar for the two communities discussed here. Nieuwpoort was founded by the count of Flanders, who developed the city in a favorable location at the mouth of the Yser, a few kilometers from the sea. Via connections with two waterways — the Ieperleet and the Venepe — Nieuwpoort acted as an outport for cities such as Ypres, Veurne, and St-Omer.[23] From the fourteenth century,[24] the port, with its infrastructure and shipbuilding industry, became an interface between seagoing and inland shipping,[25] as well as a crucial connecting hub between the northeastern cities of Bruges and Ghent and the cities in the southwest.[26] Located on the left bank of the Yser, the city controlled all incoming and outgoing traffic to and from the sea. Within the urban space, Nieuwpoort housed a count's castle. At the beginning of the fifteenth century, a large part of the urban budget went to the walls and reinforcement of the city, as well as the port infrastructure on the left bank of the Yser.

Ostend's position on the edge of the sea made it spatially highly uncertain. A storm surge of seawater in 1394 forced the city to give up part of its territory and to move the urban space — including buildings

22 Grass was used as a building material on all continents and in all cultures. For an overview, see: Zámolyi and Herbig, 'Reed as building material'. For the use of straw in shipbuilding, see: Jeroen Vermeersch, Kristof Haneca, and Daly Aoife, 'Doel 2: A second 14th-century cog wrecked in Den Deurganck, Doel, Belgium', *The International Journal of Nautical Archaeology* 44:2 (2015) 338.

23 R. Boterberge, 'Historische geografie van het overstromingsgebied van de IJzer in de middeleeuwen', *Handelingen van de Maatschappij voor Geschiedenis en Oudheidkunde van Gent* XVI (1962) 20, 105, 119.

24 Roger Degryse, 'Oude en nieuwe havens van het IJzerbekken in de Middeleeuwen', *Handelingen van het Genootschap voor Geschiedenis te Brugge* 84 (1947) 17-21.

25 Emile Vanden Bussche, 'L'Yperleet', *La Flandre. Revue des Monuments d'Histoire et d'Antiquités* 13 (1882) 177-246; Antoine De Smet, 'Le compte de la navigation entre Bruges, Nieuport et Ypres', *Handelingen van het Genootschap voor Geschiedenis te Brugge* LXXII (1929) 167-180; Maurits Coornaert, *De topografie, de geschiedenis en de toponimie van St.-Pieters-op-de-Dijk tot 1899. Met een studie over de waterwegen* (Bruges 1972) 44-60; Karel Loppens, *Geschiedenis van Nieuwpoort* (Coxijde 1953) 21-28.

26 Marci Sortor, 'The Ieperleet affair. The struggle for market position in late-medieval Flanders', *Speculum* 73:4 (1998) 1068-1100.

such as the town hall — inland. This operation was accompanied by negotiated agreements with the neighboring rural communities and the payment of rent on the plots of land they ceded. The city was not concerned with walls but more with good and safe access to the sea. In 1445, the inhabitants started digging a harbor dock, crossing the dunes, building a water dam, and moving a number of waterways. This harbor dock and the direct, more convenient access to the sea brought Ostend prosperity. However, the immediate proximity of the sea always remained a major risk.

Their positions along the seacoast were the main motivation for both Nieuwpoort and Ostend to purchase straw and reed. In general, the products served two purposes: to provide light signals to support shipping along the coast and to reinforce the dikes, dunes, and seawalls. The light signals were given in the *vierboetes*, the lighthouses, of which Nieuwpoort had built two and Ostend one. The beacons were not permanently operational, but only when a fleet of herring fishermen or merchants wanted to call at the ports.[27] Reed was also occasionally used in warning fires lit in the dunes, for example, when fishermen had to be notified of impending danger.[28] With only a few exceptions,[29] the fuel for the lighthouses always consisted of dried reeds. Although available, other fuels were not considered. Wood, peat, and oil are abundantly mentioned in the accounts of Nieuwpoort and Ostend. Wood was occasionally collected as combustible material,[30] but mainly brought in from other regions as construction material.[31] Peat was a local product, dug en masse and used in the hearth as a heat source.[32] Oil was mainly purchased to clean and lubricate *engienen*, mechanisms like weapons and tower clocks.[33] Presumably wood, peat, and oil could not produce the same intensity of light at a better price than reed did.

27 GSA, CdC, Registers, 36775 (1472), f. 20 v.

28 This use happened, for example, in Blankenberge and Lombardsijde, see the example of the latter town in 1487: GSA, CdC, Registers, 35898 (1487), f. 13v.

29 Because the lighthouse in Nieuwpoort had been destroyed by a fire, a lantern was used in 1413 in which candle wax provided the signal: GSA, CdC, Registers, 36717 (1413), f. 58r.

30 As '*berinchhoute*': GSA, CdC, Registers, 36770 (1467), f. 31r.

31 For example: BSA, Oud Archief Nieuwpoort, 3485, f. 59r. About the overexploitation of wood in Flanders, see: Koen Deforce, 'Wood use in a growing medieval city. The overexploitation of woody resources in Ghent (Belgium) between the 10th and 12th century AD', *Quaternary International* 458 (2017) 123-133.

32 GSA, CdC, Registers, 36719 (1416), f. 1r.

33 GSA, CdC, Registers, 36730 (1427), f. 41v.

Straw was used in the dunes, dikes, and dams. Restoring the dunes was a high priority for Ostend, especially in the first half of the fifteenth century when the city did not yet have a port. The purchased thatch and straw were fixed in the sand or thrown into pits created by storms and the sea. When a high tide broke through the dunes again in 1411, the straw from several barns disappeared into the sand. The hard stems of the grass helped to reinforce the remains of the dunes and formed an obstacle against which the wind-blown sand could accumulate.[34] That the inhabitants slowly began to move inland after the storm surge of 1394 was apparently at the expense of the condition of the dunes. Dried vegetation was regularly purchased to be thrown into the pit created by a demolished homestead. As late as 1423, more than 30 years after the aforementioned flood, houses built in the dunes were demolished. The accounts of the purchased straw reveal that, in Ostend, the retreat from the unreliable dunes — located in the old territory — was a slow process. The hearth count of 1469 indicates this process was never quite completed; especially the poorer part of the population continued to live on the marginal land.[35]

In Nieuwpoort and in Ostend (following the construction of the harbor in 1445), straw was used as a material in more complex construction techniques than previously. Straw was used to make *horde*, *houde*,[36] and *vlake*,[37] that is, sturdy mats attached to the dike with brackets made of straw (*crammene*).[38] Straw was also used to *hogene* (raise) the dikes and dams and to strengthen the port infrastructure. Dried grasses were employed in combination with other vegetable building material that mainly came from trees. Such materials were referred to as *rise*, *broom*, *tronk*, and *theen* and consisted of twigs or young shoots, apparently preferably from the willow.[39] Only occasionally and in much smaller volumes were straw and reed used as roofing material in urban infrastructure.[40]

34 For the exact wording, see: GSA, CdC, Registers, 37239 (1403), f. 9r; 37242 (1406), f. 7v; 37244 (1408), f. 9-f. 10r.

35 Jos De Smet, 'Het oude Oostende. Anno 1469', *Biekorf* 42 (1936) 238-241.

36 Sometimes also '*heurden*', see: Roger Degryse, 'Rekening van de Nieuwpoortse haringvangst en konvooiering van 1474', *Mededelingen van de Marine Academie Antwerpen* XI (1959 1958) 107.

37 GSA, CdC, Registers, 36722 (1419), f. 47v.

38 Soens, *De spade in de dijk?*, 160.

39 GSA, CdC, Registers, 37243 (1440), f. 6r.

40 Non-flammable material, such as tiles, was often used. See: Willy Dezutter and Marc Ryckaert, 'Brandgevaar en bouwvoorschriften in de Middeleeuwen. Een vroeg Vlaams voorbeeld: Aardenburg 1232', *Archief. Mededelingen van het Koninklijk Zeeuwsch Genootschap* (1976) 14-39.

Since the unit of measure of dried vegetation changed throughout the century (more about this variation later), estimating the amount of the purchased vegetation is not so easy. Between 1389 and 1492, the city council of Nieuwpoort purchased an average of 35,000 bundles of straw and reed, and Ostend purchased 25,000 annually. A comparison with the accounts of other cities in the county of Flanders provides an idea of the size of those purchases. In the accounts of, for example, Deinze, Geraardsbergen, Kaprijke, Tielt, and Veurne, grasses do not appear or only occasionally, and then only a few hundred bundles, usually intended as thatching material for urban property.[41] This is also the case for Bruges, Damme, Monnikerede, Hoeke, and Mude, cities that had their own harbors.[42] Blankenberge and Lombardsijde, two neighboring towns along the same coast, mention straw and reed more often, but usually less extensively and without clearly stating the quantities involved.[43] However, the price those cities paid for the products suggests the volumes were much smaller. Biervliet, a port city at the mouth of the Honte, did use large volumes of straw, but after 1428 often entrusted the purchase to the contractors who undertook the dike work, so we have no insight into exactly what was purchased.[44] In neighboring regions like Zeeland and Holland, the port cities Rotterdam and Middelburg do mention straw in their late medieval accounts, particularly the latter city, which expended these materials in dike works of its outport Arnemuiden. However, their purchases do not show larger quantities nor a systematic approach.[45]

In the first half of the fifteenth century, the volumes of straw and reed purchased by Nieuwpoort and Ostend varied greatly from year to year, suggesting they were responding to a need that was difficult to predict. This volatility largely disappears in the second half of the century, when the purchase of straw and reeds became more regular, which may mean supply of and demand for them could be better

41 GSA, CdC, Registers, 33009 (1405-1422); 33012 (1445-1446); 33035 (1469-1470); 33919 (1408-1409); 33923 (1436-1437); 33945 (1471-1474); 34547 (1396-1397); 34571 (1440-1441); 34601 (1470-1471); 35241 (1408-1409); 35267 (1448-1449); 35285 (1468-1469); 38320 (1409-1410); 38336 (1436-1437); 38357 (1471-1474).

42 GSA, CdC, Registers, 32461 (1406-1407); 32493 (1439-1440); 32522 (1469-1470); 33544-33628; 35671-35743 (1394-1487); 36391-36464 (1394-1485); 36547-36634 (1400-1512).

43 GSA, CdC, Registers, 32148-32218 (1400-1501); 35829-35898 (1407-1488).

44 GSA, CdC, Registers, 32061-32126 (1404-1489).

45 Huibert Martin Kesteloo, *De stadsrekeningen van Middelburg*, vol. I and II (Middelburg 1881). Johan Hendrik Willem Unger and W. Bezemer, *De oudste stadsrekeningen van Rotterdam* (Rotterdam 1899).

matched. The management of the risks caused by the sea apparently remained out of crisis mode. What the purchased material was used for we learn mainly from the accounts of Nieuwpoort; those of Ostend are less useful.[46] The largest share (82 percent) of dried grass purchases was reed for the lighthouses in Nieuwpoort. Smaller amounts were used in urban infrastructure (2 percent), to counter the threat of seawater (13 percent), and under the general indication *stede bouf* (town needs, 3 percent) used only in the first half of the century. From 1460 — except for a few minor exceptions — only the use of reed as material for the lighthouses remained. It is unclear whether this change indicates an accounting or infrastructural development: Did the town council outsource all work on dikes and dams from that point on, or was dike work no longer necessary? Generally, straw ended up in the sand or dikes and the helophytes in the beacon fires. Unlike straw, reed was not used to protect against the sea.

A market for straw and reed

The above-mentioned division into straw for the dunes and reeds for the fires is evident every year in the sources of the port cities, but each year nuances are introduced. The accounts of the communities reveal a wide repertoire in the types and qualities of the products purchased. The purchased straw is referred to as regular 'straw', 'new' straw, or 'old' straw. Gradually, the straw was also named after the type of grass it came from, such as wheat, barley, rye, and oats. The terms straw and *glui* are used side by side, indicating they were considered two products. The *glui* is often described as *schoon* (good quality) and, exceptionally, as *quaet* (bad). This distinction also applies to reed, which is sometimes called 'green', a sign it was harvested too early.

This variety of grasses had an similarly large variation in price, as figure 2 illustrates. The graph reveals a hierarchy of the grasses and helophytes based on the average purchase price. Roof thatch — the so-called *deeckx* or *old dec* — was the cheapest raw material, followed by barley straw, new straw, and reed. The most expensive raw materials were *glui* and the straw of rye and wheat. Wheat straw was sometimes three times more expensive than the raw material simply called 'straw'. Figure 2 also illustrates the volatility of prices. The price of old

46 GSA, CdC, Registers, 36701-36793 (1391-1492).

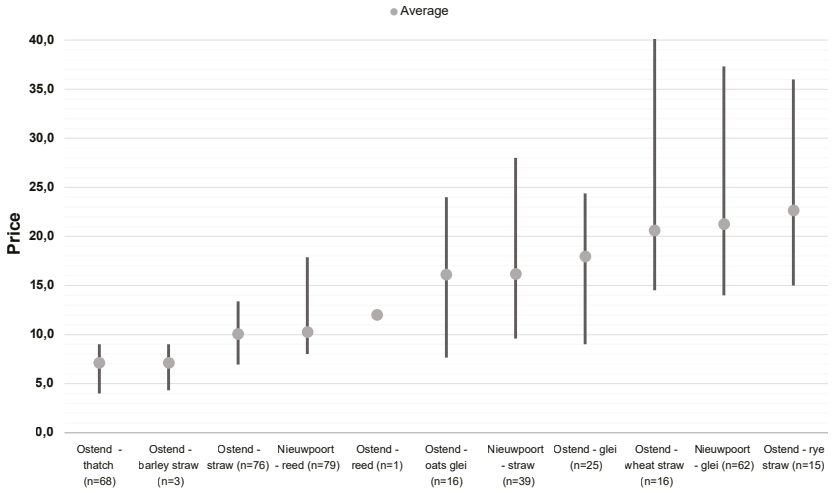

Figure 2 Price of straw and reed between 1389 and 1492: average, minimum, and maximum

'n' = number of years mentioned in the city account. The price is expressed in shillings (Parisis) per hundred bundles. Only the dried grasses that were supplied per hundred or thousand bundles are shown in the chart. Nieuwpoort only used roof straw that was years old but bought it in voeder.

thatch and new straw remained relatively stable; it is mainly the more expensive raw materials that exhibit large fluctuations in pricing.

The volatility in the prices of the raw materials is pronounced at the end of the fifteenth century, which is related to the fact that more expensive raw materials only appeared in the sources at the end of the century (see figure 3). This volatility in price and the use of old thatch is particularly evident in Ostend, whereas straw gradually disappeared from the city accounts in Nieuwpoort. Recycled old thatch was an important raw material, especially in Ostend, though hardly for Nieuwpoort, perhaps because the houses in that city often had tiled roofs. The cost of the grasses consisted not only of the purchase price, but also random costs, such as loading and unloading, transport, *lijfkoop*,[47] tolls (mentioned only once), and planting. The latter was conducted for 1 shilling per 100 bundles, about 1/8th of the value of the material. It is striking this work was not paid at a daily price, as was the case for many dike works, but at a unit price.

Not until the end of the century did prices also begin to fluctuate in the same year, which happened more frequently in Nieuwpoort than in Ostend. The Ostend account of 1470 reveals the price also depended on

47 A glass that is collectively raised to confirm the purchase.

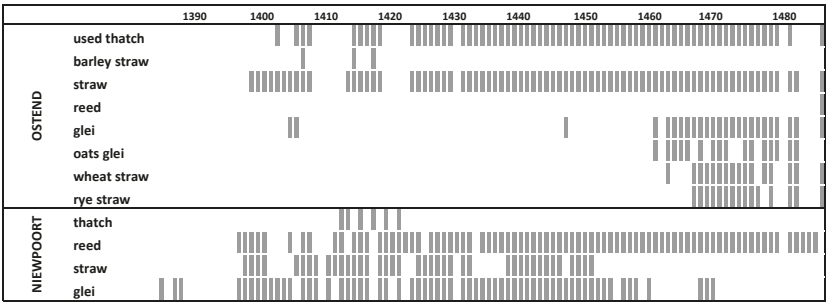

Figure 3 Evolution in the occurrence of grasses in urban annual accounts.

the time the grass could be delivered. New straw purchased before *Sint-Jansmesse* (the Feast of St. John, June 25) cost 10 shillings Parisis per 100 bundles, but it climbed to 17 shillings and more *na den oegst* (after harvest). Only for a short period (1403–1423), and only for Ostend, do we know in which month the grasses were purchased (see figure 4). It is unsurprising that July was the top month for the purchase of new straw. Old thatch was mainly available in spring and summer, presumably because roofing material was preferably replaced or repaired in these seasons and could be resold to the city council. In the winter months, old roof thatch was less available for understandable reasons.

New straw always seems available in large quantities, except in November and December. Storage in barns and haylofts presumably provided flexibility. The delivery of smaller quantities (such as a quarter of a hundred) was typical for the recycled thatch, most likely due to minor repairs to roofs.[48] The supply and demand of new straw were not always optimally matched. New straw was abundantly available in summer, when the dike works were also being planned. In the fifteenth century, this work was increasingly being carried out by external specialists and workers rather than the local community.[49] On the other hand, the urgent repairs and maintenance of dikes and dunes were probably mainly necessary in winter for meteorological reasons. Presumably, this point made the port cities dependent on large farmers who had storage capacity for winter.[50] The reed supply was probably

48 The average supply of '*deeckx*' is less than half that of straw (449 versus 1018).

49 Tim Soens, Greet De Block, and Iason Jongepier, 'Seawalls at work. Envirotech and labor on the North Sea Coast before 1800', *Technology and Culture* 60:3 (2019) 693.

50 Tim Soens, 'Flood security in the medieval and early modern North Sea area. A question of entitlement?', *Environment and History* 19:2 (2013) 209-232. In winter the wind is usually stronger. For the differences in wind speeds per season in the twentieth century: Hydrographer of the Navy, *Dover Strait Pilot*, second edition, vol. NP28 (Taunton 1981) 52-53.

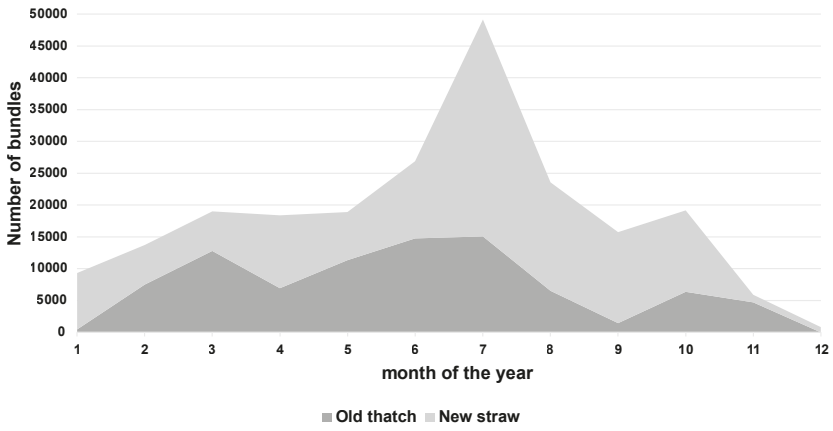

Figure 4 Volume of old and new straw (in number of bundles) per month of purchase in Ostend (1403–1423).

more in line with the demand than that of straw. Since reeds obstructed the drainage of the water in the waterways, they were removed by the water boards. The *neminghen* stipulated this work had to be done before *St-Baafs* (October 1), on the eve of the season in which the watercourses would have to handle a lot of water.[51] The reed harvest coincided with the herring harvest, the so-called *theilt*, the herring season that ran from the end of August to the beginning of November, a period when lighthouses were used intensively to guide fishermen to the port.

The spending behavior of both port city governments suggests straw and reed satisfied an essential need.[52] The municipal administrations took measures to increase their control over the market supply and demand. In the town councils, the refinement of purchasing processes grew. The straw and reed market experienced increasing standardization and the introduction of formal purchasing agreements. At the same time, by optimizing their fiscal policy, the port cities were able to increase their income and switch to higher-quality products when satisfying their need for dried grasses. With regard to the essential need for dried

51 The water board of Blankenberge: BSA,Watering Blankenberge, 333 Account from 1475-1476; BSA, Oud Archief Nieuwpoort, 6092; The water board of Eiesluis: Bruges, OCMW Archief, Fonds Sint-Jans Hospital, Box 11,27 2 (1454).

52 About the difference between an essential and non-essential need: Andreas Chai and Alessio Moneta, 'Back to Engel? Some evidence for the hierarchy of needs', *Journal of Evolutionary Economics* 22:4 (2012) 655. Valeria Constatini and Chiara Martini, 'The causality between energy consumption and economic growth. A multi-sectoral analysis using non-stationary cointegrated panel data', *Energy Economics* 32 (2010) 601.

grasses, at least in Ostend we can witness income elasticity of demand: Increasing tax returns enabled the port city to replace inferior products with more expensive, but superior goods. I will now discuss these findings in greater detail.

Standardization

The basic measure and unit with which straw and reed were traded in Ostend and Nieuwpoort evolved. As usual in a Western European medieval economy, the measure was very much determined by the way the products were produced and traded, not by how they were consumed. The quantities of the supplied material were initially named according to the storage place from which it came or the means of transport. In the Flemish coastal cities, straw was initially delivered as a *schuur* (barn), a *hoop* (heap), a *dek* (roof), and a *voeder* (carriage) – imprecise units that proved difficult to use for comparison and calculation. These soft units were used in both Ostend and Nieuwpoort exclusively in the first quarter of the century, with a minor exception in both Nieuwpoort and Ostend in the third quarter of the century. These soft units suggest a somewhat informal approach to the market. What was available from relatives and in the immediate vicinity was purchased. Straw was probably originally intended to be used in private households or businesses, so it was not a marketable product, but circumstances eventually made it so.[53]

However, clear and measurable hard units gradually grew in importance. The hundreds and thousands of bundles of vegetation in the sources are variously called *bond*, *boon*, *ybont*, *ghebint*, and *schove*. What these 'bundles' contained is only revealed at the end of the fifteenth century when Nieuwpoort switched to negotiated purchase agreements with suppliers (see next section), and it is stated in the Nieuwpoort accounts that a bundle should be five palms thick.[54] With few exceptions, dried grasses labelled 'straw' were delivered in the hundreds, and the 'reed' in the thousands, in both cities. This finding suggests the volumes of reed transactions in the coastal region were generally larger than those of straw.

53 Arjun Appadurai, 'Introduction: Commodities and the politics of value', in: Arjun Appadurai (ed.), *The social life of things. Commodities in cultural perspective* (Cambridge 2003) 9.

54 GSA, CdC, Registers, 36785 (1482), f. 21.v; 36793 (1491), f. 33v.

The trade in straw and reed experienced increasing homogenization during the fifteenth century.[55] The units moved towards larger standardization, which probably only happened because the system offered advantages that benefited both producers and consumers:[56] The quality and quantity of the traded product could be compared more easily, recurring discussions about price were avoided, and future projects could be planned more accurately. The expected thickness of the bundle communicated in the city accounts indicates the standardization of the amount was probably accompanied by the standardization of the product itself: anomalies were not accepted, whereas certain shape and quality were expected. That this bundle had a regional name[57] was probably due to the language of the producers rather than the characteristics of the product. Although straw and reed were rural products that did not have to be imported, the presence of towns such as Nieuwpoort and Ostend presumably played a role in the standardization of the bundles, as was the case with other product sizes and units often imposed by the cities on the countryside.[58] The comital Court of Finances — the *Chambres des Comptes* in Lille — probably contributed to the standardization, too. It is known that the *Chambres des Comptes* made financial supervision in Flanders stricter, more efficient, more effective, and more rational.[59] It was not unusual for the commissioners of the count — who annually went over the city accounts — to impose management rules on the city councils, so as to prevent corruption and excessive debt. In 1430, the commissioners ordered the Ostend aldermen to provide a written *quitancie* for each delivery of straw, a receipt that had to be sealed by the local bailiff.[60] Accounting transparency can only be achieved when accounting units are clear to all parties involved.

55 Igor Kopytoff, 'The cultural biography of things. Commoditization as process', in: Appadurai (ed.), *The social life of things*, 64-73.

56 Stephanie Aulsebrook, 'Rethinking standardization. The social meanings of Mycenaean metal cups', *Oxford Journal of Archaeology* 37:2 (2018) 148, https://doi.org/10.1111/ojoa.12134.

57 See the variants mentioned earlier in the text; in Brabant the unit of straw was called '*mandel*': A. Wyffels, 'Maten en gewichten', in: Jan Craeybeckx and Charles Verlinden (eds), *Dokumenten voor de geschiedenis van prijzen en lonen in Vlaanderen en Brabant* (Bruges 1959) 13.

58 Erik Thoen, 'Historische metrologie', in: Jan Art (ed.), *Hoe schrijf ik de geschiedenis van mijn gemeente*, vol. IIIa Hulpwetenschappen (Ghent 1995) 132. Jessica Dijkman, *Shaping medieval markets. The organisation of commodity markets in Holland, c. 1200 – c. 1450* (Leiden [etc.] 2011) 225.

59 Erik Aerts, *Geschiedenis en archief van de Rekenkamers. Overzicht van de archieven en verzamelingen van het Algemeen rijksarchief* (Brussels 1996).

60 GSA, CdC, Registers, 37258 (1430), f. 1r.

Purchasing agreements

That both towns provided a separate section in their accounts for the annual purchase of these large volumes of straw and reed signals that acquiring these materials was not self-evident. The sources do not provide much information about the geography of the market of straw and reed but justify the assumption that it covered a wide area. The products were brought in from the interior, where the grains were produced and waterways drained the fields. In Nieuwpoort, the reed was purchased in neighboring places like Veurne[61] and Koekelare,[62] delivered by barge to the lock on the outskirts of the city, and then taken by cart and horse to the *riethuus* (the reed house built by the city), where the bundles were stored. In Ostend, too, people looked to the rural hinterland for their grasses. Ostend used its relations with the water board of *Serwoutermansambacht* to secure straw. The products, for example, were purchased in Bredene, a hamlet a few kilometers to the east of the port city.[63] The parish priest of Ostend was also the receiver of the water board, a job that required him to roam and inspect the area.[64] In 1411, however, the city complained to the so-called *meentucht* — the general meeting of the landowners of the water board — that an old custom was being violated. That custom consisted *van houden tiden* (since ancient times) of the guarantee that a bundle of straw from every *gemet* land (a parcel of about 0.44 hectare) in *Serwoutermansambacht* would be offered to Ostend.[65] It is understandable that these types of customs were in place: the rural hinterland also benefited from Ostend's dunes and dikes being properly maintained. That the old custom was violated is an indication the competitive demand for straw was high and supply was limited. In the fifteenth-century coastal region, livestock farming became increasingly important, accompanied by a reduction in cereal crops in favor of grazing land.[66]

61 GSA, CdC, Registers, 36717 (1413), f. 50v; 36727 (1424), f. 43r.

62 GSA, CdC, Registers, 36770 (1467), f. 31r.

63 GSA, CdC, Registers, 37305 (1428), f. 13r.

64 GSA, CdC, Registers, 37253 (1422), f. 2v.

65 GSA, CdC, Registers, 37246 (1410), f. 10v. The disagreement had roots in an earlier dispute over the cost of maintaining the dikes; see: Tim Soens, 'Waterbeheer in een veranderende samenleving. Een ecologische, sociaal-economische en politiek-institutionele studie van de wateringen in het Vlaamse kustgebied in de overgang van de middeleeuwen naar de moderne tijden. Testregio: het Brugse Vrije' (Unpublished Doctoral Thesis, Ghent University 2006) 516-517.

66 Erik Thoen and Tim Soens, 'L'histoire de l'élevage, des prés et du pâturage', in: Francis Brumont (ed.), *Prés et pâtures en Europe occidentale* (Toulouse 2008) 77-99.

Map 1 Sixteenth century map of Nieuwpoort and the neighbouring network of waterways assuring the supply of reed

(Source: Madrid, Biblioteca National de España, Jacob van Deventer, Planos de ciudades de los Países Bajos. Parte II, 1545, 62:63.)

It is notable that the violation of this ancient custom occurred in the first quarter of the fifteenth century, a period when imprecise, soft units were mainly used. This period (1403–1423) is also when Ostend accounting is extensive and provides us with socio-economic information about the suppliers of straw. During this period, more than a hundred persons[67] provided the material at least once. More than 53 percent of all deliveries were made by fourteen individuals who delivered grasses at least seven times. The leading supplier was Jan Meegoed, who made 31 deliveries in sixteen financial years. This man functioned as mayor or treasurer for several years, paid the largest share of city taxes, and thus apparently belonged to the city's elite.[68] The other suppliers from the top of the list also belonged to the higher strata of Ostend; some were tenants of the town's duties and could afford *joncwijfs* (maids). The list of the suppliers mainly consists of men, but it also mentions twelve widows, among whom the widow Jurdaens made three deliveries, continuing the tradition of her wealthy husband.

67 133 names are mentioned in different spellings and sometimes with nicknames such as 'Jan langer dan zijn bed' (John longer than his bed). It is difficult to determine whether these are always unique individuals.

68 In 1419, Jan Meegoed belonged to the 10 percent of inhabitants who contributed the largest share to the so-called pointing.

Women also participated in the *boeten* (stoking) in the lighthouses;[69] the men were at sea — which made women's involvement in supplying raw materials plausible. A large portion of the suppliers only delivered once, and the straw supplied usually consisted of old thatch. The accounts, therefore, also contain contributions from, for example, the sisters of the *gasthuus* (hospital), clerks of church wardens, priests, and bailiffs. This factor again illustrates that acquiring enough straw was not easy: the whole community was involved.

In Nieuwpoort, too, the same people, year after year, seemed able to supply the city with large quantities of reed. Over time, the deliveries were taken over by sons, suggesting this service was passed down from generation to generation. In 1482, the city of Nieuwpoort finally concluded a purchase agreement with the three suppliers who had provided most of the reed in previous years.[70] That agreement entailed a promise from the suppliers, with few obligations from the city in return. The agreement meant that reed of a certain quality would be supplied at a certain price for nine years. It is striking that the price stated in the framework contract did not differ from that already paid in previous years, and that no quantity was guaranteed, but only "alle jaer alzo vele riets als de steden behouven zal" (every year as many reeds as the city shall need). It seems that old trust relationships that were supposed to guarantee the obligations associated with the trust would be fulfilled[71] were now formalized or institutionalized. Ostend's protest against the *meentucht* of *Serwoutermansambacht* illustrates those old relationships were not irrevocable. In Nieuwpoort, at the end of the fifteenth century, the guarantee was finally converted into a contract. Each year, the city accounts accurately tracked which year of the nine-year framework contracts they were in. The accounts also reveal the three collaborating partners each delivered just one third of the reed. When one partner died, the contract was continued by the widow. Working with a purchase agreement was apparently a satisfactory solution for all parties: when the contract expired after nine years, a new one was drawn up.

69 GSA, CdC, Registers, 36702 (1392), f. 63v.

70 GSA, CdC, Registers, 36785 (1482), f. 21v: "de voorseide personen hebben belooft ende coop ghemaect metter stede te leveren ter plecke ghecostumeirt noch 9 jaer naer dit jaer alle jaer alzo vele riets als de steden behouven zal vijf palmen dicke elken bondt om 5£ tduust".

71 About the concept "trust networks" as "accumulation of commitment", see: Charles Tilly, 'Cities, states, and trust networks. Chapter 1 of cities and states in world history', *Theory and Society* 39:3/4 (2010) 271-273.

Fiscal policy and income elasticity of demand

As in the larger cities of the county of Flanders,[72] in Nieuwpoort and Ostend the choices of the governing elites regarding fiscal policy, financial management, and priorities demonstrated their fundamental social views. That these choices differed in the two coastal cities discussed here is illustrated by the well-documented conflict, litigated in 1483–1484 by the "Three Members of Flanders" (the cities of Ghent, Bruges, and Ypres), which, as representatives of the third estate of the county, negotiated economic and foreign policy with the prince.[73] Nieuwpoort — supported by Damme and Sluis — tried to prohibit the use of the port of Ostend by legal means. In this dispute, Nieuwpoort presented itself as a hub of *coopmanscepe* (merchantship) in a walled city in a safe location on the left bank of the Yser. Ostend — as a spatially very uncertain jurisdiction — described itself as a specialist in *visscherie ende neeringhe vander zee* (fishing and maritime trade), where a sort of nomadic existence was inescapable.

For the rooted city of Nieuwpoort – three kilometers away from open sea – the lighthouses were of crucial importance. Due to its position on the edge of the sea, Ostend had other priorities. However, by taking risks, by intervening in the water management system, and by constructing the harbor dock in 1445, the latter port city was eventually more suitably equipped for participation in the high seas fishery and the herring industry. Ostend was able to apply other taxing techniques than the so-called excises – the typical taxation on consumption[74] – gradually shifting the source of its income to levies on barrelled herring. The increased income affected the quantity and nature of straw Ostend required and was able to purchase. The light gray graph in figure 5 illustrates the annual amount of dried grasses the port city purchased in bundles (left axis); the black line indicates the same purchase as the share of the total urban expenditure of that year (right axis). The two intersecting straight lines in the center of the chart are the linear trend lines for the same data.

72 The example of Ghent: Marc Boone, 'Triomferend privé-initiatief versus haperend overheidsoptreden', *Tijdschrift voor Sociale Geschiedenis* 15:2 (1989) 114.

73 Edward Vlietinck, *Cartulaire d'Ostende. Texte original avec notes et additions précédé d'une introduction historique* (Antwerp 1910) no. 54.

74 Marc Boone, 'The Burgundian Low Countries', in: Dennis Menjot et al. (eds), *The Routledge handbook of public taxation in medieval Europe* (London [etc.] 2022) 254-269.

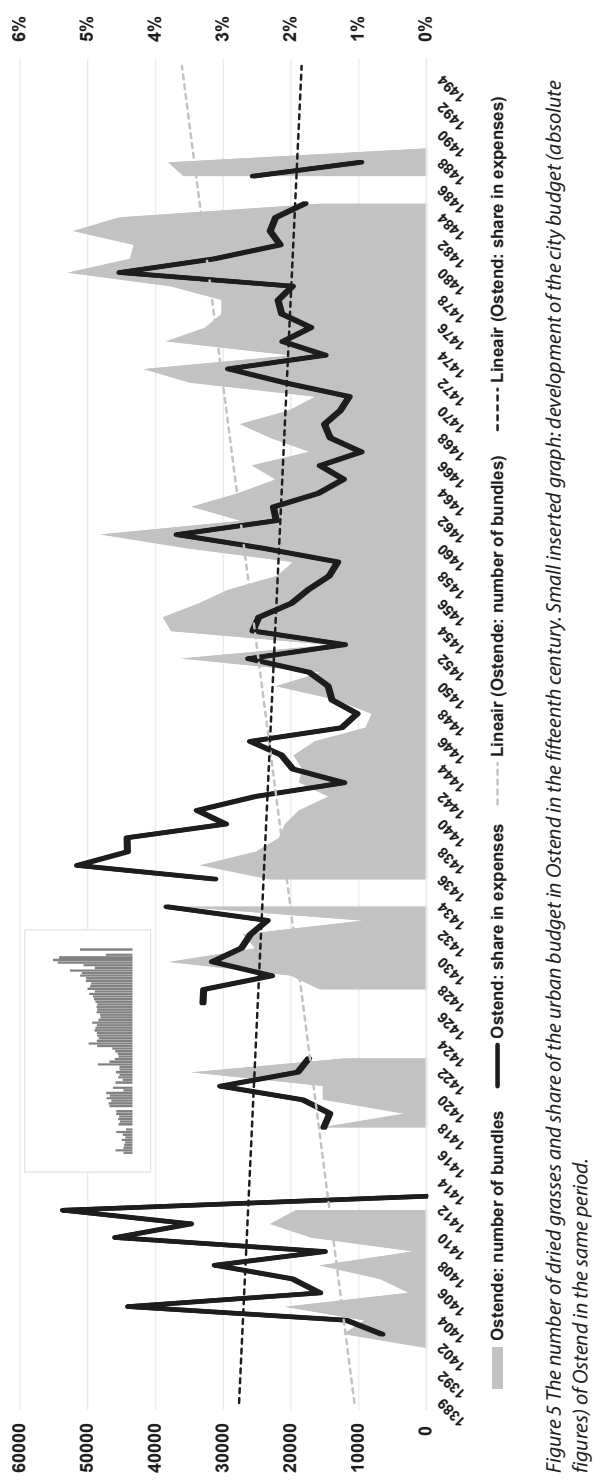

Figure 5 The number of dried grasses and share of the urban budget in Ostend in the fifteenth century. Small inserted graph: development of the city budget (absolute figures) of Ostend in the same period.

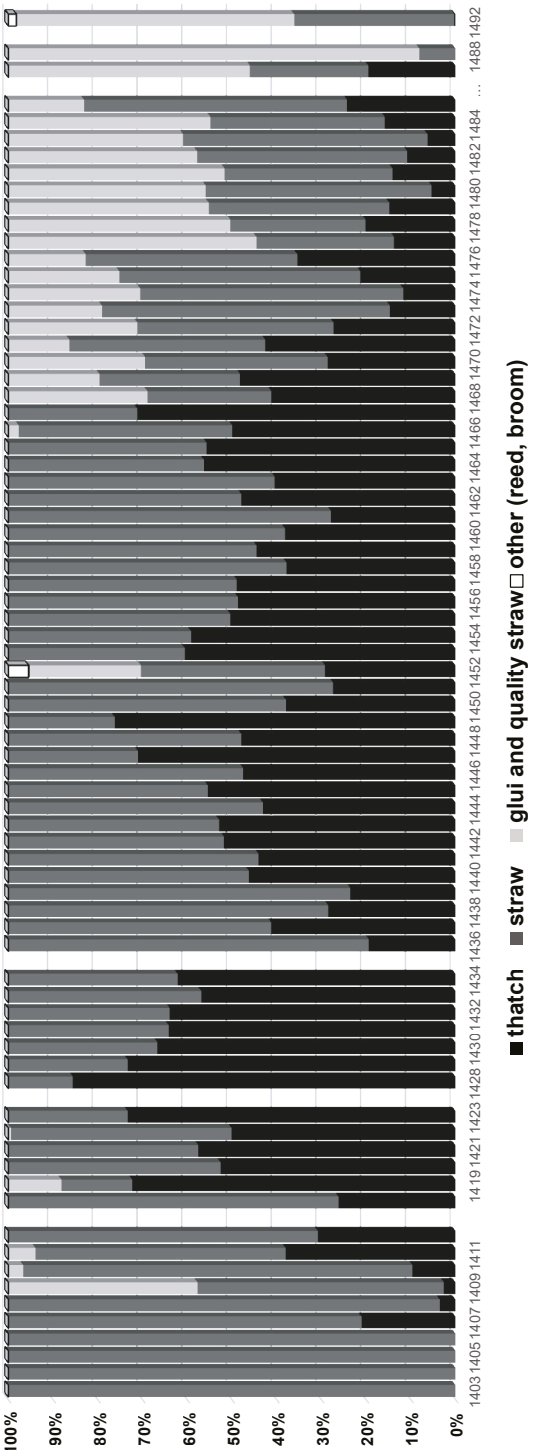

Figure 6 Overview of the share of dried vegetation purchased annually by Ostend, by type.

That these trend lines intersect is immediately noticeable. The absolute number of bundles of grass purchased annually tripled by the end of the fifteenth century, whereas the share of the city budget required to purchase these volumes fell, on average, by one third. This decrease is related to the construction of the harbor dock, which was also a tipping point for Ostend's finances. The city budget rose remarkably and steadily (see inserted graph in figure 5) thanks to the changing economic activities. The new harbor encouraged fishermen to exploit the sea. A fishing fleet brought large volumes of fish to the quay, where they were sold to the highest bidder.

The absolute increase in expenditure on the purchase of dried grass probably was related to the above-mentioned changes in the water management in the city. According to the people of Ostend themselves,[75] the new waterways and harbor dams were an advance in protecting against the threat of water. In addition, a larger city budget was available. As a result, not only were more dried grasses bought but also more expensive ones: straw from inferior grasses was replaced by more high-quality grasses. This transition is visible in Figure 6.

In the first half of the fifteenth century, old thatch was more prevalent. In the third quarter of the century, old thatch was replaced by new straw, only for it to be gradually replaced in the last quarter by *glui* and the straw of more expensive grasses. Ostend thus demonstrates that changes in the fishing industry and water management also had an influence on the straw market.[76]

These findings bring us to the last important observation. In both Ostend and Nieuwpoort, the aldermen addressed the purchase of dried grasses. The port cities did not leave the grass market to chance, though they each did so in their own way. The main concern for Ostend seems to have been the proper maintenance of the dikes, dams, and dunes. The supply of the required straw was, therefore, organized by the city itself, whereas the organization of the lighthouse was outsourced: the *vierboet meesters* (lighthouse masters) — who did not even have to be citizens of the city[77] — were given relative freedom to purchase the raw material. Nieuwpoort did the opposite: the city kept control over

75 Vlietinck, *Cartulaire d'Ostende*, 55.

76 About the effect of income elasticity of demand on markets, see: David A. Alhadeff, *Microeconomics and human behavior* (Berkeley [etc.] 1982) 115-125.

77 Jan Blate, the lighthouse master of Ostend, is mentioned as one of the '*vreemde lieden*' (foreigners) in the Ostend city accounts. GSA, CdC, Registers, 37250 (1419), f. 23v.

both lighthouses,[78] the reed, and the reed house but outsourced the maintenance of the dikes and dams to private initiatives.

Conclusion

When studying maritime communities, historians often focus on the economy of fisheries[79] but rarely pay attention to the economy of straw and reed exploitation. This article has demonstrated the significance of the grass market and the strategies the communities developed to access it. The grass market developed at the crossroads of urban growth, commercializing agricultural economy, and ecological change. The purchase and use of straw and reed distinguished the communities along the coast from those inland. Even though they had different emphases, the coastal cities of Nieuwpoort and Ostend were alike in their choice of the repertoire of raw materials they used to meet an essential need. Starting with non-grasses, such as *messe ende andre vulnessen* (dirt and other waste), each city scaled up to old thatch, reed, new straw, *glui,* and finally, to straw of highest quality.

Coastal communities purchased more straw and reed than those inland, largely due to the proximity to the sea. Dried grasses were essential commodities for coastal communities to manage the risks associated with the sea. Protection against the threat of nature and safeguarding shipping were priority concerns for coastal communities. Straw was essential to strengthen the dikes and dunes, and reed was the fuel for the lighthouses. The maritime, seagoing communities did not leave the market for these grass-derived products to chance. Their approach to the grass market evolved from an improvised to a more predictable one. The purchasing strategies could count on increasing standardization and formalization, and their development ran parallel to an optimization of urban financial management. This study has demonstrated that straw and reed could have an important role in the strategies communities deploy to cope with the challenges of the landscape. The fact that an efficient and well-considered purchase and use of straw and reed contributes to resilience, too, is often overlooked.

78 Except for an interlude of 6 years, between 1393 and 1399. See: Roger Degryse, 'De oudste vuurbakens van de Vlaamse kust en nabijgelegen Noordzeeoevers (811 – einde 16de eeuw) (deel I)', *Handelingen van de Maatschappij voor Geschiedenis en Oudheidkunde van Gent* 36 (1982) 68-69.

79 E.g. Roger Degryse, 'De Vlaamse haringvisserij in de XVe eeuw', *Handelingen van het Genootschap voor Geschiedenis te Brugge* 88:3/4 (1951) 116-133.

About the author

Kristiaan Dillen (°1959) is a member of the Henri Pirenne Institute for Medieval Studies and of the Department of History at Ghent University. In his research he focuses on the relationships between maritime communities, port cities, and their hinterland in the late medieval county of Flanders.
E-mail: kristiaan.dillen@ugent.be