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ARTÍCULOS DOCTRINALES / *ARTICLES*

PECULIARITIES OF ACCOUNTING FOR MERCHANDISE COSTS IN BADOER'S LEDGER

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Abstract: The *Spexe de marchadantia* account, employed in commercial accounting during the 14th and 15th centuries, has long provoked scholarly debate, though few researchers examined it systematically. Modern analysis of this account in Jacomo Badoer's *Libro dei conti* (1436–1439) faces substantial challenges: significant material deterioration and damage to the archival source have obscured critical accounting entries. Through digital reconstruction techniques, the authors recovered previously unreadable text and restored informational losses in the ledger. This methodological approach enabled comprehensive analysis of Badoer's accounting procedures, revealing that the *Spexe de marchadantia* account functioned as both an expense distribution mechanism and a significant profit-generating instrument through commission fees and markup accumulation. The digital methodology thus transforms damaged historical sources into analyzable datasets, offering new interpretative possibilities for understanding pre-Pacioli accounting sophistication.

Keywords: *digitizing history, digitalization; history of bookkeeping; double entry; venture accounting; Spexe de marchadantia, Jacomo Badoer.*

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INTRODUCTION

The first contribution of this paper lies in revealing the purpose, structure, and content of the *Spexe de marchadantia* account, an account that was rarely used in the accounting systems of the late Middle Ages, insufficiently studied, and subject to various debates. In the present paper, this account is examined in sufficient detail; Badoer repeatedly employed it to record accounting operations related to the emergence of commercial overhead expenses, their registration and allocation, and, most importantly, the transformation of this procedure into a revenue item.

In contrast to the *Spexe de marchadantia* account, which consisted of two separate accounts ("For many expenses on trades from us and our friends, expenses gave profits" and "For many expenses on trades"), employed half a century earlier in the proprietorships and partnerships of Francesco Datini in Pisa, this study examines a more advanced version of the account, in which both components are presented opposite each other within a single account.

The second contribution of this paper lies in resolving the uncertainty regarding the amount of overhead costs that is characteristic of various authors. The study establishes an average indicator of overhead costs per batch of goods sold, based on a large number of overhead-cost transactions and a substantial quantity of batches sold.

The third contribution of this paper is the development and description of the digital research methodology adopted in a study of the *Libro dei conti* of Jacomo Badoer. This rare Venetian archival source, dating from 1436–1439, contains significant informational losses: many pages of the Ledger have been irretrievably lost, and most of the remaining pages are either poorly legible or entirely illegible. The developed methodology and information technologies make it possible to compensate for informational losses and to conduct a detailed investigation of the accounting procedures applied, including those related to the use of the *Spexe de marchadantia* account.

In the Tractate of Luca Pacioli in 1494, Pacioli declared the Venetian method the best to use. This primarily reflects the synchronization of the Ledger with the Journal of chronological entries: nothing can be recorded in the Ledger that is not registered in the Journal. In this regard, the study of archival sources preserved in the State Archive of Venice, relating to the first half of the fifteenth century and preceding the earliest descriptions of double-entry bookkeeping, merits close attention. These are the records of the Soranzo brothers (1406–1434), the business records of the Venetian merchant, Andrea Barbarigo, (1430–1449), and the Ledger of Venetian merchant, Jacomo Badoer, trading and acting in Constantinople as an agent for other merchants between 1436 and 1439.

Of course, the Venetian method of accounting finds its fullest expression in the accounting system of Andrea Barbarigo, since most Ledger entries derive from Journal registrations De Roover (1946), Kuter et al. (2025a), Lane (1944). At the same time, the Libro dei conti of Jacomo Badoer, although not accompanied by a chronological Journal, remains highly significant. Giacomo Badoer, unlike Andrea Barbarigo, was more proficient in bookkeeping, rarely made mistakes (which did not lead to corrections), consistently recorded all the subtleties of commercial operations in his accounts. He left a rich legacy in the description of various coins characteristic of the era and region. Badoer widely used cumulative consecutive line accounts to calculate indicators of various types of income and expenses, which made it possible at the end of the journey to construct the final financial results account *Utel e Dano* – Profits and Losses – account.

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The *Spexe de marchadantia* account was by no means employed in all companies of the late Middle Ages. We are aware of its use in the companies of Francesco Datini in Pisa and Barcelona, as well as in the book of Badoer.

PREVIOUS STUDIES OF THE BADOER'S LEDGER

Fabio Besta was the first to mention and comment on Jacomo Badoer's Libri dei conti in 1880 (Besta, 1880). He described the book in more detail in his major work Corso di ragioneria professato alla classe di magistero nella r. Scuola superiore di commercio in Venezia in 1891 (Besta, 1891) and then in all editions of La ragioneria (Besta, 1909). Valery Alfieri (1891) published a detailed description of the Libri dei conti. Noted 20th-century scholars further studied the Ledger: Tommasso Zerbi (1952), Frederic C. Lane (1944, 1945, 1977), Alvaro Martinelli (1974), C. Morrisson (2001). Other scholars who discussed the ledger include Federigo Melis (1950), Raymond de Roover (1945, 1956), G. Astuti (1968), and Carlo Antinori (2004). More recent studies include those by Ganchou (2003), Hocquet (2010), Iida (1998). And, of course, the most sustained attention to this Ledger came from Edward Peragallo (1977, 1980, 1981, 1983).

The *Spexe de marchadantia* account has unfortunately received little attention from previous researchers of Badoer's book. At the same time, it is one of the most interesting accounts of medieval accounting... E. Peragallo (1977: 885), who dedicated four publications to Badoer's book and is among the foremost authorities in this field, offered only a brief and uninformative discussion, citing Lane:

"Badoer's financial investment in the wares unloaded from the four galleys was substantial. Fully half of the merchandise was either for his own account or in partnership with another merchant. One of his first tasks was to defray initial merchandising expenditures (spexe de merchadantia), which included a customs duty of one percent payable to the 'bails' (chomerchio del nostro bails una per c.). The bailo was an appointed government representative of considerable importance. He was considered to be the governor of the Venetian colony, its commercial consul and ambassador to the reigning emperor [Lane, 1973, p. 100]"

The "Conclusions" of T. Zerbi (1952: 408) also failed to clarify the issue:

"*The account "Merchandise expenses" records on the debit side general commercial costs as well as certain accessory costs of purchase and sale arising from cash outflows or debtor or creditor accounts, while it records on the credit side the shares of such expenses, however reclassified at the charge of the various batches of goods. The values reclassified as debit of the batches of goods are not necessarily related to the expenses actually incurred, but are often proportional to the rates and percentages allowed by common market practice*".

A. Martinelli, in his dissertation, devoted only four incomplete lines (1974: 899-900) to the issue under consideration out of fourteen pages of text:

"*The account "Expenses of merchandise" was debited for general mercantile costs and other additional costs of purchase and sale, and it was credited for costs which had been reclassified to specific lots of merchandise*".

This suggests that merely identifying the debit and credit purposes seemed sufficient for the author.

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De Roover (1956: 144), describing the accounting mechanism of Francesco di Marco Datini's company in Barcelona, was the first to conclude that:

"The puzzling feature that merchandise expense (Spexe di mercantantie) has a credit balance is easily explained; it is simply due to the fact that commissions, brokerage and other fees charged to consigner abroad were credited to this account. Since these credits exceed the amounts actually spent, Spexe di mercantantie, instead of being an expense, turns out to be a source of income".

In doing so, de Roover expressed surprise, "why professor Zerbi finds this procedure faulty and strange" (Zerbi, 1952: 135).

A digitized copy of Jacomo Badoer's *Libri dei conti* appeared in our personal DB (database) much earlier (2016) than the mass digitization of historical heritage became widespread. However, actual research on this source began only in 2021. On the one hand, this delay reflected the 'enthusiasm' for research on the archives of the Tuscan merchant Francesco Datini, particularly with regard to the companies of Francesco di Marco Datini in Pisa (1382–1406), where the account discussed in this article was referred to as 'Expenses that provided profit' (Kuter, 2022, 2024; Sangster et al., 2018). More than five hundred accounting books, collected from various locations and stored in his "castle" in Prato, turned out to be in relatively good condition, thanks to Federigo Melis (1962, 1972) who systematized them. Each preserved page received new numbering, which often coincides with the codes assigned by medieval accountants, indicating an insignificant loss of pages from the books.

Unfortunately, this cannot be said of Jacomo Badoer's *Libri dei conti*, many pages of which have been irretrievably lost, and the information on most of the preserved pages is partially or completely illegible. Entire sections of lost pages are missing, for example, folios 327r-348v, 366r-367v, and the final pages of the book 403r-418r. Of particular interest for this study is folio 339v-339r, which contains the eighth page (out of ten) of the sequential *Spexe de marchadantia* account.

For this reason, previous researchers, who were few, when considering any direction of income or expense, reached about halfway through the book and ceased further study, seeing no prospect of successful completion.

The authors who wrote about Jacomo Badoer's Ledger can be divided into two groups: the first includes those who described, mentioned, or referenced it; the second those who conducted research. The second group is small and includes Frederic C. Lane and Edward Peragallo. Moreover, the *Spexe de marchadantia* account was considered a controversial object at the time, which may explain why Peragallo did not begin its investigation.

The author of the present study was initially unaware of Dorini and Bertele's volume (1956), in which researchers in the history of numismatics attempted not only to translate the surviving texts but also to reconstruct certain lost pages. This initially led to avoidable duplication of effort. However, our study proved to be more comprehensive, as Dorini and Bertele, moving from the first pages to the end of the book, restored only the lost missing direct double-entry indicators, thereby neglecting the summarized totals that should have been transferred to the final pages. We were able to obtain more accurate final totals because this work was also undertaken.

Dorini and Bertele's research was limited to the study of coins in circulation. Our study aims to expand our understanding of the accounting methods and procedures of medieval Venetian bookkeeping. In this regard, Badoer's Ledger is unique, as it contains illustrative examples from various areas of merchant activity, including various types of income and expense transactions.

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In our opinion, research on medieval accounting complexes should not be limited by the volume of the presented text. The more thoroughly and meticulously they are studied and described, the more beneficial this is for future generations of researchers. Previous studies of Badoer's ledger, including the comprehensive work by Edward Peragallo (1977, 1980, 1981, 1983), were necessarily constrained by the methodological tools and technological capabilities available at the time. The application of modern digital technologies — particularly computational analysis and digital restoration techniques — now enables us to overcome many of these earlier limitations. What was previously inaccessible due to physical damage to the manuscript or the constraints of manual analysis can now be systematically digitized, reconstructed, and examined in its entirety, revealing patterns and accounting practices that remained obscured in earlier scholarship.

Digital Approaches in Accounting History and Their Use for the Research of the Badoer Ledger

The digitisation of archival sources creates fundamentally new methodological opportunities for accounting historians that were inaccessible within traditional analogue research. As convincingly argued by Alan Sangster in his article 'Going digital' – Its place in research into the history of modern accounting (2023), digital technologies allow researchers "to make accessible what is not, make visible what is not seen and make usable what is considered unintelligible". High-resolution imaging enables detailed palaeographic analysis of medieval manuscripts, while full-text search and machine translation expand the geographical and linguistic scope of inquiry, revealing patterns and connections that would remain hidden in sequential analogue reading and mitigating long-standing language barriers in Anglo-Saxon historiography. At the same time, Sangster underscores the epistemological and technical limits of digitisation: inadequate scan quality, transcription inaccuracies, and translation errors—especially in archaic or dialectal texts such as Luca Pacioli's 1494 treatise—necessitate rigorous verification and interdisciplinary collaboration. Accordingly, digital tools should be regarded not as a substitute for, but as a complement to, traditional historical methods, enhancing research capacity while preserving critical scrutiny and contextual interpretation.

Various scholars and research groups (for example, Quinn & Murphy (2023), Kuter et al. (2025a, 2025b)) are conducting separate experiments on the use of digital technologies in the processing of archival materials. Particularly noteworthy are the systematic methodological developments presented in Gurskaya et al. (2020), Kuter et al. (2017, 2018, 2019, 2020, 2022, 2024), and Sangster et al. (2018), which demonstrate a comprehensive approach spanning from initial conceptualization through digital preservation of archival photographs to transformation into analyzable digital datasets and readable reports. These studies, based on materials from the archives of Florence, Genoa, Venice, and Prato, employ logical-analytical (flowchart-based) modelling to reconstruct historical accounting systems, establishing a rigorous framework that subsequent research can build upon.

Current scholarship on Badoer's ledger identifies the following as the most urgent research priorities:

Methodological contributions:

- Development of digital methodology for archival research, enabling reconstruction and verification of damaged historical accounting records.
- Application of digital restoration techniques to recover previously illegible data and

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establish complete sequential account structures.

Substantive historical findings:

- Analysis of compound entries as evidence of advanced Venetian accounting practices.
- Systematic examination of key accounts forming the structural foundation of Badoer's bookkeeping model: "*Utel e dano*" (profit and loss), "*Cassa*" (cash), *Spexe de marchadantia* (merchandise expenses), "*Provixion de mi Jachomo Badoer*" (agency commission), and other accounts that systematically transferred their balances from page to page.
- Comprehensive reconstruction of Badoer's business operations based on digitally restored closing entries.

The procedure of accounting in the *Spexe de marchadantia* account.

Figure 1 presents the logical-analytical (block diagram) model of the *Spexe de marchadantia* account as featured in the Ledger of Jacomo Badoer. Table 1 displays the primary indicators of each of the ten sequential pages of the *Spexe de marchadantia* account, enabling the calculation of the main characteristics of the account.

Table 1 – Key indicators of the sequential pages of the *Spexe de marchadantia* account

Account	Operations		Total of page	Saldo		Total net		Profit
	Debit	Credit		Debit	Credit	Debit	Credit	
017/1	11	45	640.3.0	–	74.22.0	640.3.0	565.5.0	-74.22.0
078/1	7	41	2019.19.0	–	58.6.0	1944.21.0	1961.13.0	+16.16.0
137/1	12	43	764.0.0	355.22.0	–	408.2.0	764.0.0	+413.4.0
174/1	16	33	866.14.0	396.12.0	–	470.2.0	512.16.0	+42.14.0
232/1	6	39	1149.9.0	948.10.0	–	200.23.0	752.19.0	+551.20.0
290/1	10	41	1642.13.0	1357.8.0	–	285.5.0	697.3.0	+408.22.0
315/1	14	12	1480.7.0	757.11.0	–	722.20.0	122.23.0	-599.21.0
339/1	12	23	–*	991.12.0	–	300.5.0*	612.0.0*	+234.1.0**
372/1	14	37	1840.9.0	1365.10.0	–	474.23.0	848.21.0	+373.22.0
409/1	13	6	1498.17.0	1036.22.0	–	461.19.0	133.7.0	-328.12.0
Total	**117**	**319**	**–**	**–**	**–**	**5909.3.0**	**6970.11.0**	**+1036.22.0**

* On page 339/1 it is not possible to fully reconstruct all entries:
** The actual accumulated operating result on page 339/1 (+234.1.0) is determined as the difference between the credit opening balance on page 372/1 (991.12.0) and the debit closing balance on page 315/1 (757.11.0)

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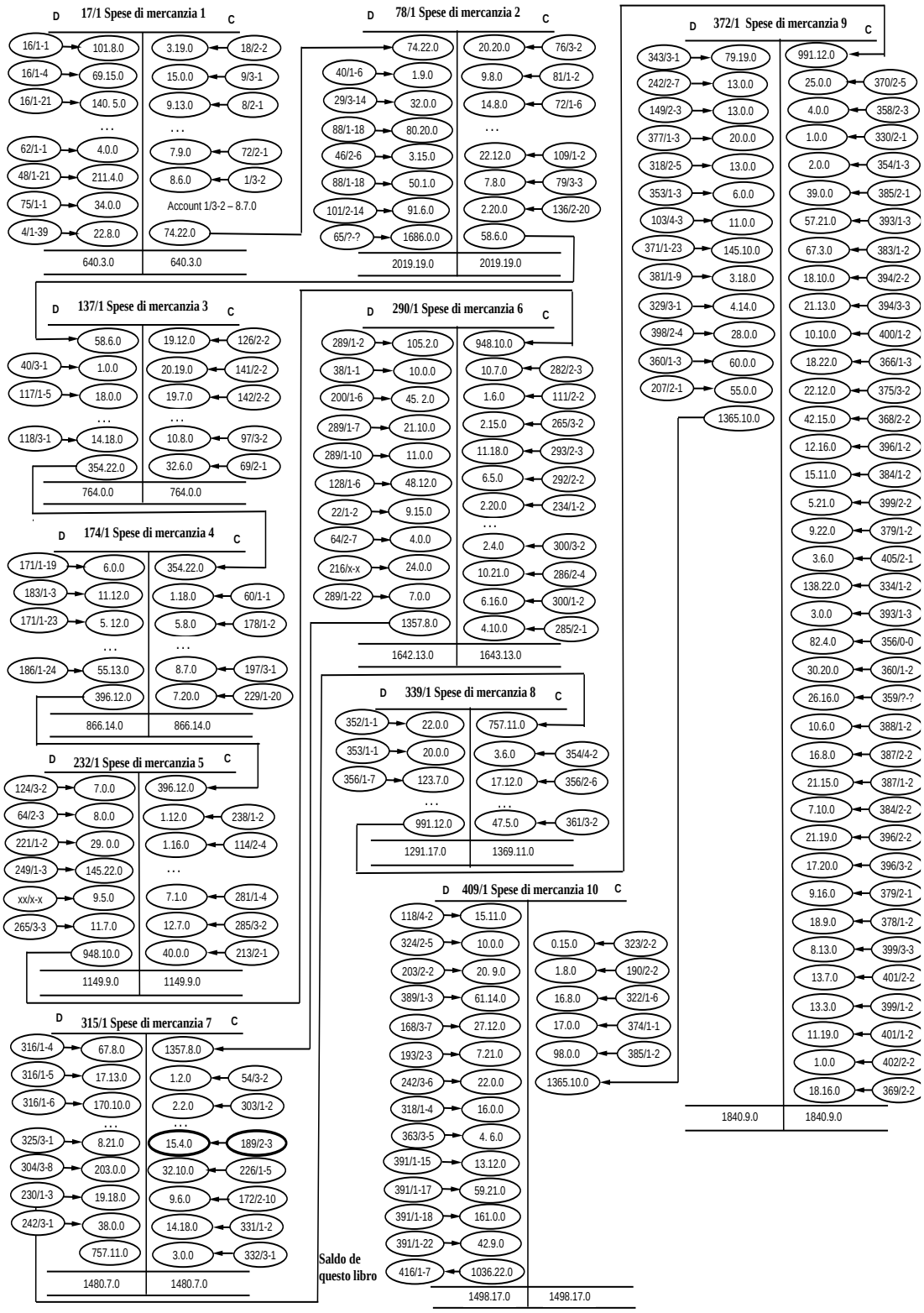

Figure 1. Logical-analytical model of *Spexe de marchadantia* account

Badoer's ledger documents 117 distinct categories of overhead expenses. While Badoer

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himself managed this complexity within his own accounting framework, the task confronting modern scholars—precisely reconstructing how each expense category was allocated across 319 specific purchase-and-sale transactions based on a fragmented and often illegible source—presents an analytical challenge of such magnitude that it necessitates the application of digital technologies and logical-analytical modeling.

However, it can be confidently stated that the amounts of interest to Jachomo Badoer, added to the incurred overhead expenses, were substantial. If the profit of perp. 1036 car. 22, accounted for in the *Spexe de marchadantia* account, is divided by the total amount of overhead expenses (perp. 5909 car. 3), then for every perp. 1 invested, there is an average profit of car. 4 q. 1, which represents a 17.55% return on investment. Each of the 117 expense items provided perp. 8 car. 20 q. 3 in profit, and each of the 319 batches of goods sold – perp. 3 car. 6 in profit. For a comprehensive exposition of the subject of the study, let us consider the methodology of accounting in the accounts related to the *Spexe de marchadantia* account.

Figure 2 presents a digital copy of the second section on karta 189 – "*Fil de fero barili*" at the original *Libro dei Conti*. A translation of the section's text, which makes it possible to understand the structure and content of the entries, is provided in Table 2.

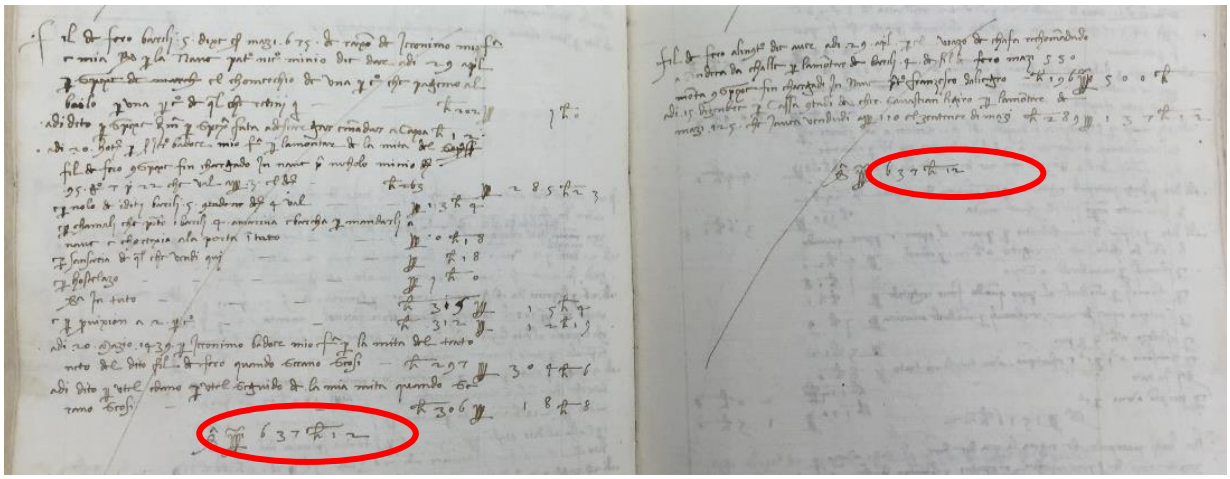

Figure 2. Digital copy of second account of karta 189 *"Fil de fero barili"*

The second entry (correspondence 2631-2), the account for settlements with the merchant's brother, Jeronimo Badoer, reflects the cost of the acquired goods, amounting to *duc.* 95 *g.* 7 *p.* 22 at *perp.* 3 per duchato. It is important to note here that Jacomo simultaneously accounted for settlements with his brother both for the import of goods, as in this case, and for the share due to his brother from sales, as in the case that will be described later.

The third entry with a total of *perp. 15 car. 4*, transferred to the credit of the ninth entry on *karta* 315 – the seventh karta of the consecutive line of the *Spexe de marchadantia* account, the subject of the present study, contains four analytical sums that have their own historical background.

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Table 2. Translation of the entries from the second section on karta 189 —*"Fil de fero barili"*

PD	Description	Contra entry	Amount
1	Iron wire barrels 5 said to be 675 bunches of Girolamo my brother and me, received through the ship of the patron Nicolò Minio, must give the 29th of April for the *chomerchio* at 1% that was paid to the *bailo* for 1% of what I considered here	— *k.* 202/3-9	*perp.* 1 *car.* 0
2	The same day for Sir Geronimo Badoer, my brother, in the amount of a half of iron wire until loading into the ship under the captaincy of Nicholo Minio *duc.* 95 *g.* 7 *p.* 22, at the rate of 3 *perp.* per *duchato*	— *k.* 263/1-2	*perp.* 285 *car.* 23
3.1	On that day for the expenses of the merchandise, for expenses incurred for unloading and sending home	— car. 12	
3.2	and for the freight of the said 5 barrels 4 *duc.* 4 are worth	— *perp.* 13 *car.* 4	
3.3	and for the porters who carried the 4 barrels to the dock and for the boat to send them to the ship and for the courtesy to the port, in all	— *perp.* 18 *car.* 0	
3.4	and for the intermediation of what was sold here	— *perp.* 18 *car.* 0	
3.5	and for storage costs	— *perp.* 1 *car.* 0	
3	Sum in total	— *k.* 315/1-9	*perp.* 15 *car.* 4
4	And for commission 2%	— *k.* 312/1-17	*perp.* 12 *car.* 19
5	On the 20th day of May 1439 for Girolamo Badoer my brother for half of the clear section of the aforementioned wire, when they will be collected	— *k.* 297/3-5	*perp.* 304 *car.* 6
6	To that day for profit and loss, for the profit for my half that i collected	— *k.* 306/1-24	*perp.* 18 *car.* 8
	Total *perp.* 637 *car.* 12		

PC	Description	Contra entry	Amount
1	Iron wire in return must have on April 29 for the journey to Caffa recommended to Andrea da Calle for the amount of 4 barrels of iron wire in bundles 550 which amount with the expenses up to the loading on the ship of the patron Francesco d'Aliegro	— *k. 196*/2-1	*perp.* 500 *car.* 0
2	On December 15th cash from the chir Sabastian Ligiro for the amount of 125 decks that had been sold to him at 110 *perp.* per *zentener*	— *k.* 289/1-6	*perp.* 137 *car.* 12
	Total *perp.* 637 *car.* 12		

Initially, in the debit of karta 315 (or on *karta* 290 – the sixth karta of the consecutive line of the *Spexe de marchadantia* account, or on *karta* 232 – the fifth karta of this consecutive line, and so forth), there were entries recording the amounts of overhead expenses incurred. Subsequently, these overhead expense amounts are allocated among various commodity accounts, taking into account Badoer's interests.

In our example, these sums amounted to:

– for the freight of the said 5 barrels 4 *duc.* 4 are worth – *perp.* 13 *car.* 4
– and for the porters who carried the 4 barrels to the dock and for the boat to send them to the ship and for the courtesy to the port, in all – *perp.* 18 *car.* 0
– and for the intermediation of what was sold here – *perp.* 18 *car.* 0
– and for storage costs – *perp.* 1 *car.* 0

The fourth debit entry (corresponding to the seventeenth credit entry on *karta* 312) – the seventh karta of the consecutive line of the "*Provixion de mi Jachomo Badoer*" (Agency commission account). We discuss the accounting procedure for the Badoer commission in detail in another paper (Kuter et al., 2025b).

The fifth entry (correspondence 297/3-5), like the second, reflects settlements with the brother of the Venetian merchant. However, it is important to note that this entry pertains to a different chain of accounts related to the share due to the brother from sales.

And finally, in the debit of the account under consideration, the sixth debit entry amounting to *perp.* 18 *car.* 8 corresponds to entry 306/1-24 on the second karta of the consecutive line of "*Utel e Dano*", the profit and loss account.

In the credit of the account, there are two entries representing sales amounts: invoiced to customers for the sale of 550 mazi of goods during the "*Viazo de Chafa*" (a trading voyage to Crimea), and for the cash settlement with "*Chir Savastian Ligiro*" for the remaining 125 mazi.

The relationship between the total sums in the debit of the kartas of the consecutive line of the *Spexe de marchadantia* account and the specific sums in the debit of commodity accounts

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(for example, the second account of *karta* 189 – "*Fil de fero barili*") deserves a separate study, but it is suggested that this relationship be examined in a little more detail.

Figure 2 presents the logical-analytical model of the account "*Fil de fero barili*" on *karta* 189 and its related accounts. Here, it is clearly demonstrated how the final fourth amount (taking into account Badoer's interest) has been transferred to the credit of the seventh karta of the consecutive line of the *Spexe de marchadantia* account, where prior to this, the actual overhead expense amounts had been recorded in the debit of the account on this karta or preceding ones.

Figure 2 shows that in three instances, the overhead expense amounts (*perp.* 67 *car.* 8*; perp.* 17 *car.* 13*; perp.* 170 *car.* 10) were paid in cash from the tenth karta (316/1) of the consecutive line of the Cash account. In the remaining cases, accounts payable arose.

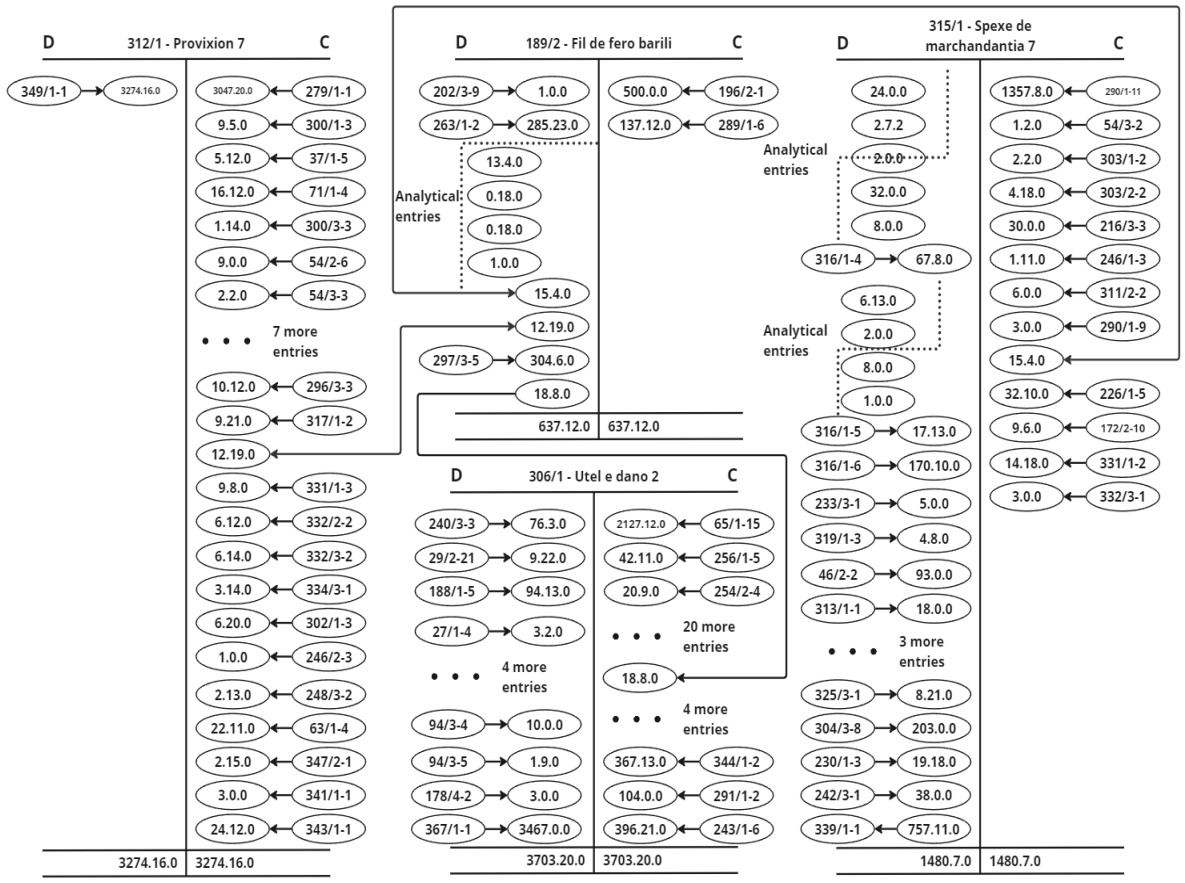

Figure 3. Logical-analytical model of connections of the 189/2 *Fil de fero barili* account

Let us note that when Badoer recorded several types of overhead expenses in the debit of the kartas of the consecutive line of the *Spexe de marchadantia* account, pertaining to a single service provider (for example, the sums *perp*. 67 *car*. 8 and *perp*. 17 *car*. 13), he also reflected on the account specific analytical sums.

Thus, we have examined the accounting mechanism in the *Spexe de marchadantia* account, where the debit side reflected the actual overhead expenses incurred, while the credit side showed the amounts covered by the purchasers of goods, which included Badoer's interest. It is no coincidence that, half a century earlier, the accountants of Francesco Datini in Pisa and

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Barcelona referred to this account as "*Expenses that brought profit*". In the Figure, one can also see the transfer of the amount *Provixion de mi Jachomo Badoer* (*perp*. 12 *car*. 19) and the operating profit "*Utel e Dano*" – *perp*. 18 *car*. 8, the central account for aggregating all profits and losses of the Venetian merchant.

The second part of the study is devoted to the application of digital technologies for the examination of archival sources from Badoer's accounting, in particular, entries related to the *kartas* of the consecutive line of the *Spexe de marchadantia* account.

CREATION OF A DIGITAL INFORMATION DATABASE FOR RESEARCH

A methodological note is warranted regarding the placement of this section. Conventionally, research methodology precedes the presentation of findings. However, in this study, the digital reconstruction methodology itself constitutes one of the principal research outcomes. The development of computational techniques for recovering damaged historical accounting data and establishing complete sequential account structures represents a substantive contribution of this investigation, as outlined in the research objectives above. Consequently, we present the methodology here, following the substantive analysis, to demonstrate how digital methods were developed in response to specific interpretive challenges encountered in Badoer's ledger.

The first and most important stage of the research, after obtaining digitized images of the pages of the accounting book, was the creation of a digital database. It contained all preserved account entries and could be used for several purposes, primarily for the restoration of lost information. For this purpose, the program complex is designed in such a way that each surviving entry, during the initial processing and input into the digital database by the cross-reference method, checks for the presence of a contra entry in the database and reproduces it if absent.

The digital database was created using a software product that combines Visual Basic for Applications (VBA) and M programming languages within the .NET environment (NET Framework).

It is noteworthy that the medieval merchant strictly adhered to the rule of entries in the Venetian account -- the total of entries on the debit side of the account necessarily equals the total of entries on the credit side. This is evidenced by the equal totals calculated by Jacomo Badoer on each side of the account. In this case, the totals amount to *perp*. 637 *car*. 12 (highlighted by us with a red ellipse). This verification mechanism proved equally applicable six centuries later.

Examining the reconstruction of the program of the *Fil de fero barili* account (Figure 2), one can observe that the "*Historical total*", calculated by the medieval merchant, and the "*Work total*", computed by the software complex (both *perp.* 637 *car.* 12), are equal for both the debit and credit sides of the account. This confirms that the entries from the Ledger have been accurately transferred to the digital database without distorting the monetary indicators.

Figure 3 presents the reproduction in the program of the second account of karta 189 –*Fil de fero barili.*

Each debit account entry of the digital database contains reference attributes: *Date of the transaction recorded in the debit account* (Date D), *Order number of the entry in the debit account* (PD), *Karta number of the contra account in the credit and (with a dash) account*

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number if there is more than one account on the page (Cor C), *Order number of the entry on the karta of the account to be credited* (Cor. PC).

Account		189/2	Acc. name		Fil de fero barili											
№	Name	Date D	PD	Cor. Date C	Cor. C	Cor. PC	SumAD	SumD	Date C	PC	Cor. Date D	Cor. D	Cor. PD	SumAC	SumC	CURR.
3533	Fil de fero barili|Chomercio	1438.04.29	1	1438.05.26	202/3	9		1.0.0								PCQ
3043	Fil de fero barili|Ser Jeronimo Badoer mio fradelo 2.5	1438.04.29	2	1438.10.21	263/1	2		285.23.0								PCQ
3535	Analytics|Non double entry	1438.04.29	3.1				13.4.0									PCQ
3536	Analytics|Non double entry	1438.04.29	3.2				0.18.0									PCQ
3537	Analytics|Non double entry	1438.04.29	3.3				0.18.0									PCQ
3538	Analytics|Non double entry	1438.04.29	3.4				1.0.0									PCQ
3534	Fil de fero barili|Spexe de marchandantia 7	1438.04.29	3	1438.05.20	315/1	9		15.4.0								PCQ
2482	Fil de fero barili|Provixion 7	1439.05.20	4	1439.05.20	312/1	17		12.19.0								PCQ
2870	Fil de fero barili|Ser Jeronimo Badoer mio fradelo	1439.05.20	5	1439.05.20	297/3	5		304.6.0								PCQ
384	Fil de fero barili|Utel e dano 2	1439.05.20	6	1439.05.20	306/1	24		18.8.0								PCQ
3539	Viazo de Chafa|Fil de fero barili								1438.04.29	1	1438.04.29	196/2	1		500.0.0	PCQ
551	Cassa 9|Fil de fero barili								1438.12.15	2	1438.12.15	289/1	6		[illegible]	PCQ
3540	Fil de fero barili Historical total							637.12.0							637.12.0	PCQ
	Fil de fero barili Work total							637.12.0							637.12.0	
	Fil de fero barili Difference							0.0.0							0.0.0	

Figure 4. Digital reconstruction of second account of karta 189 *"Fil de fero barili"*

Two amounts follow. The first amount (AD) is for debit analytical entries that disclose the next synthetic total (Sum D), which should equal the sum of the analytical entries, which is not always the case. For entries on the credit side of the account, follow the same steps, replacing '*Debit*' with '*Credit*'. To maintain the accounting transactions related to the *Spexe de marchadantia* in the Ledger of Badoer, 10 full-scale kartas were used, on which 126 debit entries and 331 credit entries are recorded. Two karta (339 and 409) are lost here.

It should be noted that the informational material on the first five kartas of the consecutive line of the *Spexe de marchadantia* account is of sufficient quality to permit research. However, starting from *karta* 290 (the digital image is provided in Figure 4), additional efforts are required to restore illegible entries.

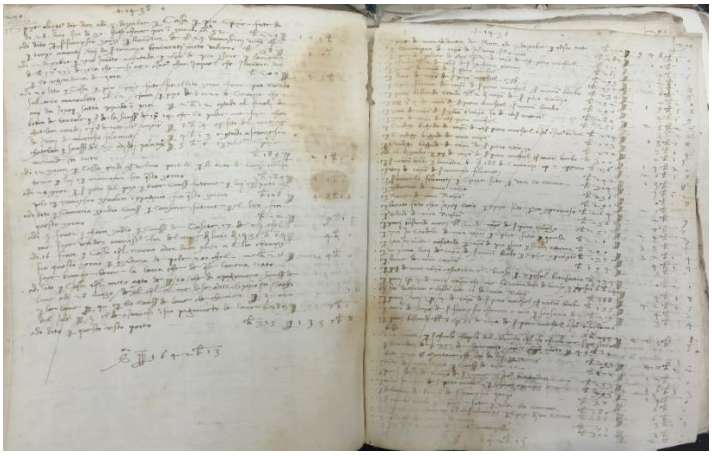

Figure 5. Digital copy of karta 290 (fully represents *"Spexe de marchadantia"* 6th account)

Furthermore, an examination of the digital image of *karta* 372 (Figure 5) underscores the necessity of developing specialized digital technologies to reconstruct illegible and irretrievably lost information.

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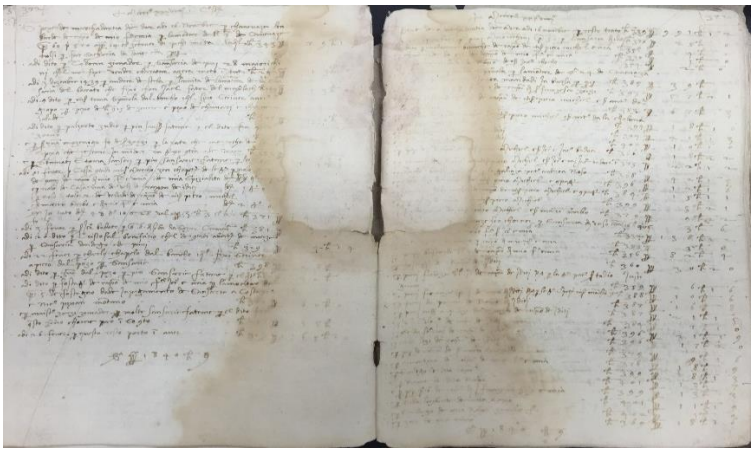

Figure 6. Digital copy of karta 372 (fully represents *"Spexe de marchadantia"* 9th account)

During the input of each surviving (legible) entry, the software automatically identifies and verifies the corresponding contra entry on the relevant account. If such an entry is absent in the database, the software generates a credit entry based on the details of the debit entry, or vice versa. This approach, on the one hand, has significantly reduced the volume of lost or illegible entries and, on the other, halved the labor costs associated with building the database.

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Reproductions in the program of the sixth karta (290) and ninth karta (372) of the consecutive line of the *Spexe de marchadantia* account on Figure 6 and Figure 7.

Account		290/1		Acc. name	Spexe de marchadantia 6											
№	Name	Date D	PD	Cor. Date C	Cor. C	Cor. PC	SumAD	SumD	Date C	PC	Cor. Date D	Cor. D	Cor. PD	SumAC	SumC	CURR.
3568	Analytics|Spexe de marchadantia 6								1438.11.00	45	1438.11.18	285/2	1		4.10.0	PCQ
3229	Analytics|Spexe de marchadantia 6								1438.11.20	43	1438.11.20	286/2	4		10.21.0	PCQ
433	Spexe de marchadantia 5|Spexe de marchadantia								1438.12.04	1	1438.12.04	232/1	7		948.10.0	PCQ
577	Spexe de marchadantia 6|Cassa 9	1438.12.05	1	1438.12.04	289/1	2		105.2.0								PCQ
572	Spexe de marchadantia 6|Ser Franzesco Zorzi fo	1438.12.05	2	1438.12.05	038/1	1		10.0.0								PCQ
527	Analytics|Spexe de marchadantia 6								1438.12.05	2	1438.12.05	282/2	3		10.7.0	PCQ
296	Pani Fiorenza de polvere de grana peze|Spexe de								1438.12.05	3	1437.09.18	111/2	2		1.6.0	PCQ
497	Analytics|Spexe de marchadantia 6								1438.12.05	4	1438.10.22	265/3	2		2.15.0	PCQ
2962	Analytics|Spexe de marchadantia 6								1438.12.05	5	1438.11.28	293/2	2		11.18.0	PCQ
3157	Analytics|Spexe de marchadantia 6								1438.12.05	6	1438.12.08	292/2	2		6.5.0	PCQ
3191	Analytics|Spexe de marchadantia 6								1438.12.05	7	1438.08.23	234/1	2		2.20.0	PCQ
3198	Analytics|Spexe de marchadantia 6								1438.12.05	8	1438.10.02	252/1	2		19.18.0	PCQ
2879	Analytics|Spexe de marchadantia 6								1438.12.05	9	1438.12.13	297/1	3		7.19.0	PCQ
3213	Analytics|Spexe de marchadantia 6								1438.12.05	10	1438.11.12	280/1	4		25.23.0	PCQ
3240	Analytics|Spexe de marchadantia 6								1438.12.05	11	1438.12.08	286/3	2		3.22.0	PCQ
3300	Analytics|Spexe de marchadantia 6								1438.12.05	12	1438.10.31	274/1	3		13.18.0	PCQ
3290	Analytics|Spexe de marchadantia 6								1438.12.05	13	1438.10.31	273/1	2		5.14.0	PCQ
3281	Analytics|Spexe de marchadantia 6								1438.12.05	14	1438.10.31	272/2	2		2.15.0	PCQ
2679	Analytics|Spexe de marchadantia 6								1438.12.13	44	1438.12.13	300/1	2		6.16.0	PCQ
625	Analytics|Spexe de marchadantia 6								1438.12.16	15	1438.12.16	300/2	2		14.20.0	PCQ
464	Ser Marin Balbi|Spexe de marchadantia 6								1438.12.16	16	1438.12.16	256/4	1		26.18.0	PCQ
2400	Analytics|Spexe de marchadantia 6								1438.12.16	17	1438.10.17	242/1	3		13.8.0	PCQ
632	Ser Marcho Filomati|Spexe de marchadantia 6								1438.12.16	18	1438.12.16	304/1	2		1.12.0	PCQ
438	Zedoaria|Spexe de marchadantia 6								1438.12.16	19	1438.08.27	236/1	2		0.18.0	PCQ
3327	Analytics|Spexe de marchadantia 6								1438.12.16	20	1438.12.05	291/2	2		27.0.0	PCQ
496	Barato fato chon Joxep Salia zudio|Spexe de marchadantia 6								1438.12.16	21	1438.12.16	264/1	14		2.9.0	PCQ
3314	Analytics|Spexe de marchadantia 6								1438.12.16	22	1438.10.20	256/1	3		7.7.0	PCQ
3406	Analytics|Spexe de marchadantia 6								1438.12.16	23	1438.10.02	251/3	2		24.3.0	PCQ
3449	Analytics|Spexe de marchadantia 6								1438.12.16	24	1438.11.16	226/1	7		33.4.0	PCQ
395	Zera in scudele|Spexe de marchadantia 6								1438.12.16	25	1438.11.20	200/1	7		32.14.0	PCQ
3390	Analytics|Spexe de marchadantia 6								1438.12.16	26	1438.10.02	235/2	2		4.14.0	PCQ
3476	Analytics|Spexe de marchadantia 6								1438.12.16	27	1438.05.05	194/3	2		3.0.0	PCQ
321	Piper|Spexe de marchadantia 6								1438.12.16	28	1438.12.28	134/3	2		0.21.0	PCQ
3416	Analytics|Spexe de marchadantia 6								1438.12.16	29	1438.09.13	240/3	1		4.18.0	PCQ
3500	Analytics|Spexe de marchadantia 6								1438.12.16	30	1438.04.29	188/1	1		42.17.0	PCQ
340	Pani vervi peze|Spexe de marchadantia 6								1438.12.16	31	1438.21.05	155/2	2		4.0.0	PCQ
414	Meio|Spexe de marchadantia 6								1438.12.16	32	1438.12.16	219/1	4		3.4.0	PCQ
3370	Analytics|Spexe de marchadantia 6								1438.12.16	33	1438.10.02	255/1	2		225.5.0	PCQ
575	Spexe de marchadantia 6|Zera in scudele	1438.12.22	3	1438.12.22	200/1	6		45.2.0								PCQ
578	Spexe de marchadantia 6|Cassa 9	1438.12.29	4	1438.12.29	289/1	7		21.10.0								PCQ
598	Ser Charlo Chapello |Spexe de marchadantia 6								1438.21.10	34	1438.21.10	293/1	6		47.12.0	PCQ
359	Teste|Spexe de marchadantia 6								1438.21.10	35	1438.21.14	172/2	8		12.0.0	PCQ
1488	Analytics|Spexe de marchadantia 6								1438.21.10	36	1438.10.02	253/1	2		16.13.0	PCQ
601	Teste|Spexe de marchadantia 6								1438.21.10	37	1438.12.10	293/3	3		14.0.0	PCQ
3395	Debitori|Spexe de marchadantia 6								1438.21.10	38	1436.12.05	037/1	1		6.0.0	PCQ
379	Ser Marin Barbo|Spexe de marchadantia 6								1438.21.10	39	1438.12.17	180/3	3		6.0.0	PCQ
534	Ser Zacharia Chontarini fo de miser Aluvixe|Spexe								1438.21.10	40	1438.11.22	288/1	2		3.18.0	PCQ
3267	Analytics|Spexe de marchadantia 6								1438.21.10	41	1437.21.03	071/1	3		3.0.0	PCQ
626	Piper pondo|Spexe de marchadantia 6								1438.21.10	42	1438.12.16	300/3	2		2.0.0	PCQ
579	Spexe de marchadantia 6|Cassa 9	1438.21.12	5	1438.21.12	289/1	10		11.0.0								PCQ
574	Spexe de marchadantia 6|Ser Piero dal Pozo sanser	1438.21.29	6	1438.21.29	128/1	8		48.0.0								PCQ
5345	Non double entry|Analytics	1438.21.29	7	1436.10.00	022/1	2		9.15.0								PCQ
573	Spexe de marchadantia 6|Chain zudio fradelo de	1438.22.03	8	1438.22.03	064/2	7		4.0.0								PCQ
576	Spexe de marchadantia 6|216	1438.22.16	9	1438.22.16	216/0	0		24.0.0								PCQ
580	Spexe de marchadantia 6|Cassa 9	1438.22.16	10	1438.22.16	289/1	22		7.0.0								PCQ
581	Spexe de marchadantia 6|Spexe de marchadantia	1438.22.16	11	1438.22.16	315/1	1		1357.8.0								PCQ
582	Spexe de marchadantia 6 Historical total							1642.13.0							1642.13.0	
	Spexe de marchadantia 6 Work total							1642.13.0							1645.13.0	
	Spexe de marchadantia 6 Difference							0.0.0							3.0.0	

Figure 7. Digital reconstruction of account 290/1 *"Spexe de marchadantia 6"*

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Account		372/1		Acc. name				Spexe de marchadantia 9								
№	Name	Date D	PD	Cor. Date C	Cor. C	Cor. PC	SumAD	SumD	Date C	PC	Cor. Date D	Cor. D	Cor. PD	SumAC	SumC	CURR.
890	Spexe de marchadantia 9|	1439.11.16	1	1439.11.16	343/3	1		79.19.0								PCQ
887	Spexe de marchadantia 9|Todorin zimador	1439.11.16	2	1439.11.16	242/2	8		13.0.0								PCQ
2442	Spexe de marchadantia 8|Spexe de marchadantia								1439.11.16	1	1439.11.15	339/1	13		991.12.0	PCQ
885	Spexe de marchadantia 9|Andrea de Stella	1439.12.03	3	1439.12.03	149/2	3		13.0.0								PCQ
894	Spexe de marchadantia 9|Miser Toma Spinola	1439.12.09	4	1439.12.09	377/1	3		20.0.0								PCQ
1656	Non double entry|Analytics	1439.12.09	5	1439.12.03	318/2	5		13.0.0								PCQ
891	Spexe de marchadantia 9|Ser Zuan Mozenigo fo	1439.12.09	6	1439.12.09	353/1	3		6.0.0								PCQ
884	Spexe de marchadantia 9|Stamati e Tomao sanseri	1439.12.09	7	1439.12.09	103/4	3		11.0.0								PCQ
845	Pani maiorichini bale|Spexe de marchadantia 9								1439.12.30	2	1439.12.30	370/2	5		25.0.0	PCQ
769	Montonine biache|Spexe de marchadantia 9								1439.12.30	3	1439.12.30	358/2	4		4.0.0	PCQ
2054	Chuori de bo chonzi|Spexe de marchadantia 9								1439.12.30	4	1439.12.30	330/2	1		1.0.0	PCQ
754	Analytics|Spexe de marchadantia 9								1439.12.30	5	1439.12.30	354/1	3		2.0.0	PCQ
1001	Damian Spinola|Spexe de marchadantia 9								1439.12.30	6	1439.22.15	385/2	1		39.0.0	PCQ
893	Spexe de marchadantia 9|Cassa 13	1439.22.03	8	1439.22.11	371/1	23		145.10.0								PCQ
895	Spexe de marchadantia 9|Ser Jeronimo Badoer mio fradelo 2.7	1439.22.03	9	1439.22.03	381/1	9		3.18.0								PCQ
889	Spexe de marchadantia 9|Cristofal Bonifatio	1439.22.03	10	1439.22.03	329/3	1		4.14.0								PCQ
896	Spexe de marchadantia 9|Ser Charlo Chapelo	1439.22.22	11	1439.22.22	398/2	4		28.0.0								PCQ
2055	Non double entry|Analytics	1439.22.22	12	1439.11.23	062/1	3		32.0.0								PCQ
892	Spexe de marchadantia 9|Fostagni bianchi bale	1439.22.22	13	1439.22.22	360/1	3		60.0.0								PCQ
886	Spexe de marchadantia 9|Maistro Zorzi zimador	1439.22.22	14	1439.22.22	207/2	1		55.0.0								PCQ
1068	Analytics|Spexe de marchadantia 9								1439.22.22	7	1439.22.18	393/1	3		57.21.0	PCQ
981	Pani bale|Spexe de marchadantia 9								1439.22.22	8	1439.22.04	383/1	2		67.3.0	PCQ
1078	Analytics|Spexe de marchadantia 9								1439.22.22	9	1439.22.15	394/2	2		18.10.0	PCQ
1073	Analytics|Spexe de marchadantia 9								1439.22.22	10	1439.22.25	394/3	3		21.13.0	PCQ
1171	Endego |Spexe de marchadantia 9								1439.22.22	11	1439.22.20	400/1	3		10.10.0	PCQ
805	Piper|Spexe de marchadantia 9								1439.22.22	12	1439.22.20	366/1	3		18.22.0	PCQ
908	Chuori de bo |Spexe de marchadantia 9								1439.22.22	13	1439.11.07	375/3	2		22.12.0	PCQ
823	Analytics|Spexe de marchadantia 9								1439.22.22	14	1439.10.10	368/2	2		42.15.0	PCQ
1095	Seda lezi|Spexe de marchadantia 9								1439.22.22	15	1439.22.22	396/1	2		12.16.0	PCQ
4090	Analytics|Spexe de marchadantia 9								1439.22.22	16	1439.22.04	384/1	2		15.11.0	PCQ
4097	Analytics|Spexe de marchadantia 9								1439.22.22	17	1439.22.18	399/2	2		5.21.0	PCQ
4110	Analytics|Spexe de marchadantia 9								1439.22.22	18	1439.12.30	379/1	2		9.22.0	PCQ
1220	Ser Franzesco Chorner|Spexe de marchadantia 9								1439.22.22	19	1439.22.26	405/2	1		3.6.0	PCQ
2232	|Spexe de marchadantia 9								1439.22.22	20	1439.21.20	334/1	2		138.22.0	PCQ
1069	El viazo de Rodosto|Spexe de marchadantia 9								1439.22.22	21	1439.08.30	353/2	3		3.0.0	PCQ
2129	Page 356 mistaken|Spexe de marchadantia 9								1439.22.22	22	1439.22.22	356/0	0		82.4.0	PCQ
778	Analytics|Spexe de marchadantia 9								1439.22.22	23	1439.09.28	360/1	2		30.20.0	PCQ
772	Analytics|Spexe de marchadantia 9								1439.22.22	24	1439.09.28	359/1	2		26.16.0	PCQ
4128	Analytics|Spexe de marchadantia 9								1439.22.22	25	1439.22.22	388/1	2		10.6.0	PCQ
4133	Analytics|Spexe de marchadantia 9								1439.22.22	26	1439.22.04	387/2	2		16.8.0	PCQ
4124	Analytics|Spexe de marchadantia 9								1439.22.22	27	1439.22.04	387/1	2		21.15.0	PCQ
4119	Analytics|Spexe de marchadantia 9								1439.22.22	28	1439.22.04	384/2	2		7.10.0	PCQ
1099	Seda stravai|Spexe de marchadantia 9								1439.22.22	29	1439.22.13	396/2	2		21.19.0	PCQ
1109	Seda lezi|Spexe de marchadantia 9								1439.22.22	30	1439.22.15	396/3	2		17.20.0	PCQ
951	Piper pondi|Spexe de marchadantia 9								1439.22.22	31	1439.22.22	379/2	1		9.22.2	PCQ
4104	Analytics|Spexe de marchadantia 9								1439.22.22	31	1439.22.22	379/2	1		9.16.0	PCQ
928	Analytics|Spexe de marchadantia 9								1439.22.22	32	1439.22.22	378/1	2		18.9.0	PCQ
1160	Analytics|Spexe de marchadantia 9								1439.22.22	33	1439.22.26	399/3	3		8.13.0	PCQ
1187	Analytics|Spexe de marchadantia 9								1439.22.22	34	1439.22.25	401/2	2		13.7.0	PCQ
1144	Analytics|Spexe de marchadantia 9								1439.22.22	35	1439.22.18	399/1	2		13.3.0	PCQ
1183	Seda lezibente|Spexe de marchadantia 9								1439.22.22	36	1439.22.22	401/1	2		11.19.0	PCQ
1204	Endego ziurlo|Spexe de marchadantia 9								1439.22.22	37	1439.22.26	402/2	2		1.0.0	PCQ
834	Analytics|Spexe de marchadantia 9								1439.22.22	38	1439.22.22	369/2	3		18.16.0	PCQ
897	Spexe de marchadantia 9|Spexe de marchadantia	1439.22.26	15	1439.22.26	409/1	1		1365.10.0								PCQ
898	Spexe de marchadantia 9 Historical total							1840.9.0							1840.9.0	
	Spexe de marchadantia 9 Work total							1849.23.0							1840.15.0	
	Spexe de marchadantia 9 Difference							9.14.0							0.6.0	

Figure 8. Digital reconstruction of account 372/1 *"Spexe de marchadantia 9"*

The study also recovered the lost eighth *karta* (339), whose outgoing balance matched the incoming balance on the saved *karta* (372) – 991 *perperi* 12 *carati*. And, undoubtedly, the pinnacle of the research of this section was the recovery of the lost last karta of the consecutive line of the *Spexe de marchadantia* account (409). As shown in Figure 8, the final total of the consecutive line of the *Spexe de marchadantia* account was transferred to the "*Saldo de questo*

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libro" account (*karta* 416), which aggregated totals from all consecutive lines and has also been reconstructed by us.

Account		409/1		Acc. name		Spexe de marchadantia 10										
№	Name	Date D	PD	Cor. Date C	Cor. C	Cor. PC	SumAD	SumD	Date C	PC	Cor. Date D	Cor. D	Cor. PD	SumAC	SumC
3140	Chir Jorgi Xatopulo|Spexe de marchadantia 10								1438.05.23	2	1438.05.23	190/2	2		1.8.0
2255	Cremexe rosesco|Spexe de marchadantia 10								1439.04.30	3	1439.04.30	323/2	2		0.15.0
3136	Spexe de marchadantia 10|x	1439.06.27	1	1439.06.27	118/4	2		15.11.0							
1858	Spexe de marchadantia 10|Piero dal Pozo sanser	1439.10.24	2	1439.10.24	324/2	5		10.0.0							
1907	Lume de sorta|Spexe de marchadantia 10								1439.11.02	4	1439.11.02	322/1	6		16.8.0
2661	Comessaria|Spexe de marchadantia 10								1439.11.23	5	1439.11.23	374/1	1		17.0.0
3137	Spexe de marchadantia 10|Franzesco Zevolin	1439.21.04	3	1439.21.04	203/2	2		20.9.0							
1246	Spexe de marchadantia 10|Ser Jeronimo Badoer mio fradelo 2.9	1439.22.04	4	1439.22.04	389/1	7		61.14.0							
998	Pani bastardi averti|Spexe de marchadantia 10								1439.22.04	6	1439.22.04	385/1	2		98.0.0
3138	Spexe de marchadantia 10|Ser Zuan dal Groto	1439.22.25	5	1439.22.25	168/3	2		27.12.0							
3139	Spexe de marchadantia 10|Ser Antonio e ser Zuan Gara	1439.22.26	6	1439.22.26	193/2	5		7.21.0							
2408	Spexe de marchadantia 10|Maistro Piero zimador	1439.22.26	7	1439.22.26	242/3	6		22.0.0							
857	Spexe de marchadantia 10|Ser Marin e ser Charlo Zien	1439.22.26	8	1439.22.26	318/1	4		16.0.0							
2175	Spexe de marchadantia 10|Ser Marcho Chalvo e Bortolamio Zientil e Bortolamio e Franzesco da Lievanto	1439.22.26	9	1439.22.26	363/3	5		4.6.0							
1247	Spexe de marchadantia 10|Cassa 14	1439.22.26	10	1439.22.26	391/1	15		13.12.0							
1243	Spexe de marchadantia 10|Cassa 14	1439.22.26	11	1439.22.26	391/1	17		59.21.0							
1244	Spexe de marchadantia 10|Cassa 14	1439.22.26	12	1439.22.26	391/1	18		161.0.0							
1245	Spexe de marchadantia 10|Cassa 14	1439.22.26	13	1439.22.26	391/1	22		42.3.0							
4422	Spexe de marchadantia 10|Saldo de questo libro	1439.22.26	14	1439.22.26	416/1	7		1036.22.0							
897	Spexe de marchadantia 9|Spexe de marchadantia 10								1439.22.26	1	1439.22.26	372/1	15		1365.10.0
3141	Spexe de marchadantia 10 Historical total							1498.17.0							1498.17.0
	Spexe de marchadantia 10 Work total							1498.17.0							1498.17.0
	Spexe de marchadantia 10 Difference							0.0.0							0.0.0

Figure 9. Digital reconstruction of account 409/1 *Spexe de marchadantia 10*

In addition, a caveat should be made regarding the amounts presented in this study. Upon completion of the comprehensive digital reconstruction of Badoer's ledger, certain figures will differ somewhat from those originally recorded by Badoer and subsequently interpreted by various researchers. The application of information technology enables systematic identification and correction of several types of discrepancies: (1) arithmetical errors made by Badoer himself in calculating totals and balances; (2) instances where amounts recorded in one account lack the corresponding entry in the counterpart account; and (3) other irregularities in Badoer's book that cannot be readily classified but become evident through computational verification. These corrections will provide a more accurate representation of the actual financial operations while preserving the historical authenticity of the source.

For example, *karta* 290 relating to the *Spexe de marchadantia* account shows 42 entries, when in fact there should be 45. The last three additional entries totaling *perperi* 21 *carati* 23, are not included in the total of the karta or in the total of the *Spexe de marchadantia* account.

CONCLUSION

This study devotes particular attention to the *Spexe de marchadantia* account, which, surprisingly, had previously remained little studied in the works of leading researchers in the history of accounting. Unfortunately, on the one hand, the poor quality of the preserved paper medium and the loss of numerous pages of text have prevented less-resourced researchers from investigating the subject in depth. On the other hand, the rare use in medieval accounting

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systems of a recording procedure whereby expenditure operations resulted in profit outcomes led even prominent scholars to misunderstand it.

This study demonstrates that the commercial expenses account played a key role in the structure of the Venetian merchant's trading operations, accumulating not only actual overhead expenses but also distributing them among various commodity accounts, taking into account Badoer's "interests". As shown in the study, Badoer's margin in allocating overhead costs among batches of goods sold averaged 17.55%. Particular attention in the research is devoted to the structure of the account. The *Spexe de marchadantia* account in Badoer's ledger consists of ten consecutive pages, with 117 debit entries reflecting expenditure operations related to overhead accounting, and 319 credit entries recording the allocation of overhead costs (including the merchant's interest) among the batches of goods sold. After each successive page, the cumulative total of operational results was summarized.

An important outcome of the research on the *Spexe de marchadantia* account was the restoration of lost pages and final figures, as well as the automatic verification of balance check of each account. This not only confirmed the reliability of the entries transferred to the database but also revealed previously unnoticed errors and inaccuracies in Badoer's accounting.

This research also demonstrates how the use of modern technologies significantly advances the understanding of historical sources. Specialized software ensures not only the preservation and accessibility of archival material but also creates fundamentally new opportunities to analyze and reconstruct lost or damaged entries, as in Badoer's case. The logical-analytical model, built on the basis of the digital database, demonstrated a complex system of correspondence between accounts (which still requires detailed study), as well as revealed a number of features in the distribution of overhead expenses and profit formation that were not noted in previous studies. Moreover, the use of digital tools allowed a deeper immersion into Jacomo Badoer's complex financial operations and highlighted questions for future research.

The digital reconstruction methodology developed for Badoer's ledger establishes a systematic framework applicable to other surviving Venetian merchant books, particularly the accounts of Soranzo and Barbarigo. While these ledgers share fundamental structural similarities in their double-entry systems and account organization, they differ in currency usage, geographical scope of operations, and specific accounting treatments. The standardized digital approach enables identification and extraction of comparable accounting elements across these sources, facilitating systematic comparison of methodological variations among Venetian merchants. Such comparative analysis promises to reveal evolutionary patterns in Venetian bookkeeping practices, distinguish merchant-specific innovations from widespread conventions, and clarify the development trajectory of double-entry accounting in its formative period. The database structure thus serves not merely as a preservation tool for individual sources but as a foundation for systematic historiographical inquiry into the emergence and standardization of Venetian accounting methods.

The growing adoption of digital technologies in modern research creates an increasing need for new approaches to analyzing historical sources. Implementing IT in research is necessary not only because the scholarly world is "going digital", but primarily because the use of advanced methods of data analysis and processing opens new horizons for the researcher, providing the opportunity to focus on what is most important – the research itself.

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