

# Luca Pacioli's Double-Entry System of Accounting: A Critique.

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## Abstract

What we know today as double entry bookkeeping is traceable to a man called Luca Pacioli, the author of the world's first printed book-keeping treatise. As the origin of all subsequent book-keeping treatises throughout Europe, Luca Pacioli's book-keeping tract is not only the source of modern accounting, but also ensured that the medieval Venetian method itself survived into our times. However, this study is aimed at critically examining the emergence of the double entry system of accounting by reviewing what past scholars and researchers have done in relation to the subject matter. This is to say that a comprehensive review of accounting literature in relation to double entry system of accounting was carried out to do justice to this study. And it was gathered that double entry bookkeeping existed amongst the early Italian merchants before Pacioli came into the scene. But the practice prior to the fourteenth and fifteenth centuries was rather crude because there were no formally documented principles to be followed. So the outburst of Pacioli in the fifteenth century recorded a landmark in the development of this all-embracing accounting system. The first ever published treatise about double entry bookkeeping was that of Luca Pacioli in his book titled "Summa de Arithmetica, Geometria, Proportioni et Proportionalita". This book became the road map for the development of double entry system of accounting. Therefore, away from the conclusions of the majority of authors and scholars in the accounting literature that Luca Pacioli is the father of accounting, he should rather be referred to as the father of modern accounting, having laid the milestone for the codification, development, preservation, and sustenance of double entry system of accounting.

**Keywords:** Double Entry, Bookkeeping, Accounting Principles, Accounting System.

## 1. Introduction

Double entry system of accounting is one which reports business transactions in such a way that each entry is recorded twice – first as a debit and second as a credit. This system was originally developed to reduce mistakes associated with bookkeeping because at the end of the day, it is expected that the sum of the debit side should be equal to that of the credit side otherwise, something must have gone wrong somewhere. The development of double entry bookkeeping has been credited to the early Italians, with the earliest known evidence from a Florence

banker dated 1211. From this time double entry bookkeeping continued to grow throughout Italian businesses, notably in Florence and Venice (Rutledge 2014). The Northern Italians developed a new kind of record-keeping, as trade flourished, to cope with the growing complexity of their business transactions. This kind of record keeping was perfected by the merchants of Venice and it later became known as book-keeping (alla veneziana - the Venetian method), otherwise referred to as the "Italian Method". What we know today as double entry bookkeeping is traceable to a man called Luca Pacioli, the author of the world's first printed book-keeping treatise. Of course the history of accounting and indeed, the double entry system of accounting cannot be complete without bringing the wonderful work of Luca Pacioli into perspective. In 1494, the principles of double entry bookkeeping were put into print by him. He published a book on mathematics called "Summa de Arithmetica, Geometria, Proportioni et Proportionalita" which means "Everything about Arithmetic, Geometry and Proportion". This book, written as a guide to existing mathematical knowledge, covered five topics including bookkeeping, for which there were 36 short chapters. And it is regarded as the official beginning of double entry bookkeeping. Frater Luca Bartolomes Pacioli was a "Renaissance man" who acquired an amazing knowledge of diverse technical subjects. He believed in the interrelatedness of widely varying disciplines and in the special importance of those, such as mathematics and accounting, which exhibit harmony and balance.

As the origin of all subsequent book-keeping treatises throughout Europe, Luca Pacioli's book-keeping tract is not only the source of modern accounting, but also ensured that the medieval Venetian method itself survived into our time. This wonderful work of Pacioli made two very important contributions to modern science and

commerce: it was the first book to deal with Hindu-Arabic arithmetic and its offshoot, algebra; and it contained his 27-page treatise on Venetian accounting. He recommended the Venetian bookkeeping above all others and said that the most important point worthy of note about the Venetian bookkeeping was that “All the creditors must appear in the ledger at the right-hand side, and all the debtors at the left. All entries made in the ledger have to be double entries – that is, if you make one creditor, you must make someone debtor”. The very first sign that double entry would stand the test of time in the event of monitoring and directing the new industrial world of factories, wages, and large scale capital investment were found in England in the works of Her Majesty’s potter, Josiah Wedgwood. Wedgwood built the world’s first industrialized factory which indeed, was very successful. Thereafter, the factory ran into trouble and Wedgwood and Thomas Bentley, his partner had serious cash-flow problems and an accumulation of stock. However, as a remedy, Wedgwood decided to adopt the principles of double entry system of accounting to thoroughly scrutinize his firm’s accounts and business practices. The result was overwhelmingly effective and favourable as he discovered that the firm’s pricing system was faulty, its production was inefficient and that it was spending unexpectedly high on raw materials, labour and overhead without collecting its bills early enough to finance expansion in production. Also, Wedgwood, during this period uncovered the difference between fixed and variable costs and immediately understood the implications of this difference and how it affects the management of his business. He realized that as production increased, the unit cost of production reduced due to the economic advantage of the fixed costs. This is to say that Wedgwood, in the course of the scrutiny of his

books using double entry, discovered the benefits of large scale production and by implication became the first cost accountant. The advent of double entry in the thirteenth and fourteenth centuries brought with it the development of modern methods of recording business transactions. Double entry has substantial advantages over the uncoordinated methods used earlier in the sense that it emphasizes the dual nature of every business transaction – for every debit entry there must be a corresponding credit entry. It provides the basis for the comprehensive and order recording of the financial aspects of the transactions of a business, affords a means of proof of accurate accounting through the equality of total debit and credit entries, and by the integration in the ledger of personal, real and nominal accounts, provides material for the development of statements of profit and loss, and of equity, assets, and liabilities. Despite the fact that accountants all over the world refer to Luca Pacioli as the father of double entry by virtue of his work which was the first known published book on accountancy, he made no claim to be the inventor of double entry as he stated in the *Summa* that he was simply describing the methods which was being used in Venice for over 200 years. He made reference to three books, each of equal importance: the waste book or memorial, the journal and the ledger. He described a sequence which begins with an inventory of the “personal belongings and household goods, estates, etc” of the merchant. Then in the memorial, individual transactions are recorded as they occur by the owner, his agents, or assistants. Here nothing should be omitted. So transactions must be carefully recorded in full. For the memorial, it is made up of a written record of transactions in their respective order of occurrence. There is no attempt to standardize the presentation of this basic material, and no special form is suggested.

For the journal, a particular form is advocated. All the entries in the inventory and the memorial are transferred to the journal. Entries in the journal are recorded in the order in which the transactions occurred. And one important feature of the journal is that its entry must distinguish between debit and credit. Accounts from the journal are thereafter written off into the ledger. The ledger has an index or table that shows the position and page of each individual account. Concerning the calculation of profit, Pacioli said that “there are certain accounts which one may not wish to transfer (to the next accounting period), such as expenses and income. It is therefore required that these accounts be closed to the profit and loss account. As for the balance on profit and loss account, he said “having seen your gain or loss by this account, you will then follow by closing and transferring it to capital accounts, where in the beginning of your affairs you entered therein the inventory...” However, the main objective of this paper is to critically review the origin of Luca Pacioli’s double entry system of accounting and how it has evolved over time. Other objectives are to examine the development of double entry system of accounting, its relevance to record keeping and financial reporting, as well as the contribution of Luca Pacioli vis-à-vis the accountancy profession. The literature review of this study has been organized to cover the evolution of double entry system of accounting, the development of double entry system of accounting, the contribution of Luca Pacioli to the accounting profession, and a critical review of Luca Pacioli’s work in relation to the accounting practice of his time.

## 2.1 The Evolution of Double Entry System of Accounting

In the accounting literature, there are various scenarios to the evolution of double entry bookkeeping resulting from the attempts made by several scholars and researchers to locate the place and time of birth of the all-embracing system of accounting. Most of these scenarios

recognized the presence of the form of record keeping in most civilizations dating back to about 3000 BC like the Chaldean-Babylonian, Assyrian and Sumerian civilizations, the producers of the first organized government in the world, some of the oldest written languages and the oldest surviving business records; the Egyptian civilizations, where scribes formed the “pivots on which the whole machinery of the treasury and other departments turned”; the Chinese civilization, with government accounting playing a key and sophisticated role during the Chao Dynasty (1122-256 BC); Greek civilization, where Zenon, a manager of a great estate of Appolonius, introduced in 256 BC an elaborate system of responsibility accounting; and the Roman civilization, with laws that required, and with civil rights which depended on the level of property declared by citizens. These forms of bookkeeping existed in the ancient world due to some reasons which are attributable to:

- i. the invention of writing
- ii. the introduction of Arabic numerals and of the decimal system
- iii. the diffusion of knowledge of Algebra
- iv. the presence of inexpensive writing materials
- v. the rise of literacy and
- vi. the existence of a standard medium of exchange.

Littleton (1927) identified the following preconditions for the emergence of systematic bookkeeping:

- The Art of Writing: This is because first and foremost, bookkeeping is a record.
- Arithmetic: This is because the mechanical aspect of bookkeeping deals with a sequence of computations.
- Private Property: This is necessitated by fact that bookkeeping records facts about property and property rights.
- Money: This is necessary because if all exchanges were completed on the spot, there would little or no impulse to make any record.
- Commerce: This is important since a merely local trade would never have created enough pressure to stimulate men to coordinate diverse ideas into a system.
- Capital: This is necessary because in the absence of capital, commerce would be trivialized just as credit would be inconsequential.

All the ancient civilizations mentioned above had these conditions in them, which is to say that each had some form of bookkeeping. But something was fundamentally missing in the early bookkeeping treatises – a scenario of the history of accounting. If we trace the history of accounting back to its origin, we would be led, naturally, to ascribe the first invention to the early merchants. The Egyptians, who for many years made glorious appearances in the world of commercial world, derived their first notions of trade from their intercourse with these ingenious people. Consequently, the people received from them their first form of accountantship, which in the natural way of trade, was communicated to all the cities in the Mediterranean. At a point, the Western empire was over-run by the Barbarians, and all the countries that made up the western empire took advantage of this incident to proclaim their own autonomy. Consequently, commerce fled after liberty and immediately, Italy, which was formally the court of the universe, became the centre of trade, to which the ruin of the Eastern empire by the Turks, into whose constitution the arts of commerce never entered, did not make any contribution. However, the people of Lombards who connected all the trading cities of Europe through the business of exchange introduced their own method of keeping accounts which of course, is the double entry. And it was known as the Italian bookkeeping.

By virtue of the development of the commercial republic of Italy, coupled with the double entry bookkeeping method that was used in the fourteenth century, the Italian bookkeeping prospered. At this time the first double entry books known to exist were those of Massari of Genoa which dated back from year 1340. In essence, Pacioli was preceded by this double entry bookkeeping by about two hundred years. In his wisdom, Raymond De Rover (1938) described the early development of accounting in Italy as follows:

The great achievements of the Italian merchants, roughly between 1250 and 1400, was to fuse all these heterogeneous elements into an integrated system of classification in which pigeon holes were called accountants and which rested on the principle of dual entries for all transactions. One should not, however, assume that balancing the books was the primary objective of the medieval accounting. On the contrary, in Italy at least, the merchants had begun by 1400 to use accounting as a tool of management control. To be sure, they were not so far advanced as we are today and they were even far from realizing all the potentialities of double entry bookkeeping. Nevertheless, they had made a start by developing the rudiments of cost accounting by introducing reserves of other modes of adjustments, such as accruals and deferred items, and by giving attention to the audit of balance sheets. Only in the analysis of financial statements did the merchants of that time little progress.

Also, in 1577, some form of double entry accounting existed among the ancient Incas.

## 2.2 The Development Of Double Entry System Of Accounting

In the sixteenth and seventeenth centuries, the “Italian method” spread techniques, such as the introduction of journals meant for the recording of different types of transactions. We have the subsidiary books used to record cash transactions as well as some particular types of expenditures. The reason for this was to keep details out of the journal and the ledger to ensure that they did not get filled up so quickly. It was common practice to have a separate cash book into which several cash transactions would be recorded and periodically, the totals would be posted to the cash account in the ledger, whether there is a summarized entry in journal or not. The practice of period financial statements evolved in the sixteenth and seventeenth centuries. In the seventeenth and eighteenth centuries was the evolution of the personification of all accounts and transactions aimed at rationalizing the debit and credit rules that are applied to impersonal and abstract accounts. According to Peragallo (1938), a new element appeared – the critique of bookkeeping. This is also the period when double entry extended its field of application to other types of organizations, such as monasteries and the state. With the critique and the widening sphere of bookkeeping, began theoretical research into the subject.”

Going by the East Indian Company in the seventeenth century through the growth of the corporation following the industrial revolution, accounting acquired a better status which was characterized by the need for cost accounting, and a reliance on the concepts of continuity, periodicity and accrual. The eighteenth century saw a treatment of assets such that at first, the asset is carried forward at original cost. And the different between “revenue” receipts and

payments were entered in the asset account and later transferred to the profit and loss account at balance date. Secondly, the asset account contains the original cost of the asset and other receipts and expenditures including proceeds from the sale of parts of the asset. This account is closed at the balance sheet date and the difference between total debit and total credit is carried forward as the account balance. Note however, that at this time, there was no debit or credit to the profit and loss account. Thirdly, upon revaluation of the asset, the new value of the asset is carried forward in the account while the balancing difference which could be either gain or loss on revaluation is transferred to the profit and loss account. The depreciation of assets, up to the early nineteenth century, was accounted for as unsold merchandise. Towards the end of the nineteenth century, depreciation in the railroad industry was seen as an unnecessary activity except where the asset in question was considered not to be in proper working condition. However, Saleiro in 1915 confirmed the existence of the following depreciation methods:

- Straight line
- Reducing balance
- Sinking fund
- Annuity and
- Unit cost methods.

The nineteenth century also saw the emergence of cost accounting as a result of the industrial revolution. Before the industrial revolution, accounting was merely a record of the external relations of one business unit with other others, which was indeed determined in the market. But when large scale productive activities started springing up, it became necessary to emphasize more on accounting for interests within the competitive units. It was also

emphasized that accounting records be used a means of exercising administrative control over the enterprise. In the early nineteenth century, the records of textile mills and of giant manufacturing firms to support two very important ideas in the accounting literature. The first was that the persistent increase in the use of fixed assets led to the development of industrial cost accounting. The second was that changes in the way economic activities were organized did not only change the temporary structure of their costs, it prompted the development of internal cost accounting procedures. In the latter half of the nineteenth century, there was the development of some accounting techniques for prepayments and accruals so as to ensure that the periodic computation profit is facilitated. The development of funds statements came at the latter part of the nineteenth century and the twentieth century. The accounting methods for such complex issues as the computation of earnings per share, accounting for business computations, accounting for inflation, long-term leases and pensions were developed.

### **2.3 The Contribution Of Luca Pacioli To The Development And Spread Of Double Entry System of Accounting**

The origin of double entry bookkeeping is generally associated with Luca Pacioli. As a matter of fact, the history of accounting cannot be complete without highlighting the wonderful work of Luca Pacioli. His book “*Summa de Arithmetica, Geometria, Proportioni et Proportionalita*” which was published in 1491 had two chapters – *de Computis et Scripturis* – describing double entry bookkeeping. His idea reflected the business activities of the Venice at as that time, especially the way they recorded financial transactions. This is to say that even before Pacioli published his book, the Merchants of Venice actually maintained accounting records which of course, they did in a particular way. So in his book, Pacioli simply described this peculiar method used by the

early merchants to keep their records. This method was referred to as “the Method of Venice” or “the Italian Method”. This is to say that Luca Pacioli did not invent the double entry system of accounting. He only described the method of accounting practiced at that time. In his opinion, the purpose of bookkeeping was to provide the trader with timely information concerning his assets and liabilities. He postulated that all accounting entries must be double hence, when a creditor is created, someone must be made a debtor. He suggested that “not only was the name of the buyer or seller recorded, as well as the description of the goods with its weight, size or measurement, and price, but the terms of payment were also shown” and “whatever cash was received or disbursed, the record was shown of the kind of currency and its converted value...”. Despite the short duration of business ventures at that time, Pacioli advocated for the closure of books and the periodic computation of profits. The translation of Pacioli’s book contributed to the spread of the “Italian Method” or what is known today as double entry bookkeeping.

### **2.4 Critical Review Of Luca Pacioli’s Work Vis-à-vis Its Impact On The Accounting Practice Of His Time**

Given that the simple system of accounting which Pacioli described in his treatise was already being practiced in Italy in the fifteenth century, the fact remains that more refined methods were known in the counting houses from which the great firms of the time were run. Even though Pacioli did not make special reference to cost accounting in his book, the Medici account books show that a crude form of this type of analysis was in use in 1531. However, in middle fifteenth century, Bene recorded two sets of books. One set dealt with the industrial side of the business and ascertained the cost of products made, while the other set dealt with mercantile affairs. Researches have shown that some form of cost analysis was in use during Pacioli’s time, even though he did not mention it in his book. For instance, Datini prepared accounts in which foreign currencies were separated in different columns thereby comparing them with local currencies at the transaction date. The result of this comparison was the recognition of the differences between the currencies as either profit or loss on foreign exchange transactions. This is not to say that Pacioli did not talk about exchange calculations. He actually did; particularly in the fourth section of the *Summa*. But his focus was on money and exchange and as such, dealt with only the accounting aspect of the problem. Upon the description of journal entries made in respect of foreign payments, Pacioli said “You must mention what kind of money you draw and remit and their values.” No effort was made to isolate within the double entry system, profits realized or losses incurred in relation to foreign exchange transactions. Also associated with the fifteenth century practices were subsidiary books and controlling and reciprocal accounts in the ledger. But Pacioli did not capture any of those in his book. Though the audit of balance sheets was a standard procedure in Medici Bank, Pacioli did not talk about auditing. He only referred to internal check.

Pacioli's work did not take a holistic view of all accounting methods. He rather described the common accounting practices of the fifteenth century Italian merchants. However, the practices he described contained a conceptual basis for accountancy as well as a series of implied assumptions which the early merchants applied in the course of the formulation of rules for the extraction of accounting information from the environment. Pacioli recognized double entry when he said in his book that "...never must an amount be entered in credit which is not also entered in the same amount in debit..." He also advised that accounts be balanced at the end of

each year even, though the procedure was not mandatory because there was no law to back it up. Yes, his recognition of the balancing of accounts was very clear. What was not clear was whether he appreciated the concept of periodic income and expense. Pacioli did not deal with the issue of accruals and prepayments in his book. This is evident in his book where transactions are on the basis of cash received and payments made within a particular period of time despite the fact that the fifteenth century was characterized by income and expenditure accounting. The concept of consistency was recognized. No doubt. In fact, he said "woe to anyone who has anything to do with people who desire to keep the books in their own way, and are always persuading you to believe that their way is better than any of the others and for such reasons they sometimes mix up the accounts of the said officers in such a manner that they do not correspond in any way." However, to ensure consistency, he advised that from the journal onwards, only one person should be mandated to keep the books.

It is clear that Pacioli favoured the cash basis of accounting and could not address the issue of financial reporting, auditing, and costing as the merchants who were mainly occupied with trading by foreign ventures, were really not concerned about those subjects. The reason behind Pacioli's failure to cover those very important areas in accounting could be due to the fact that he only described the accounting practices of the Venetian merchants. In other words, his book was somewhat behind the times as compared with the practice in other Italian cities. And Venice was the centre of trade in the Middle East where conditions of uncertainty always abound.

## 2.5 The Corollary Of Double Entry System Of Accounting

What was known as the "charge and discharge" system of bookkeeping according to Angus (2014), originated in the Mediterranean zone and was thereafter imported into Europe by the Normans. In Europe, another significant development in accounting emerged, in Italy to be specific, between thirteenth and fourteenth century. This could be as a result of the fact that the single entry system in practice as at that time could not guarantee effective internal control system, income determination, security of assets, high productivity, and the separation of private ownership of property from business'. Rorem (1937) argued that the single entry system of bookkeeping did not withstand the challenges that had to do with the nature and size of business organizations as well as the methods of providing for depreciation. Paul (1985) stated that it was the double entry system that sensitized the merchants and placed them on a position to be able to distinguish between positive and negative entries. In other words, double entry system helped them to be able to identify increases or decreased in assets and/or liabilities. Some of the positive entries that increased assets or reduced liabilities are:

- Cash receipts
- Discounts received
- Sales to customers
- Payments to creditors

On the other hand, the negative entries that increase liabilities and reduce assets are:

- Cash payments
- Discounts allowed
  
- Purchases from suppliers
- Payments from debtors.

The balanced books of accounts however, dates back to 1340 and were produced by the Massari or Stewards of the commune of Genoa, before its widespread use in Italy and beyond in 1400, (Pyle, et al 1980). The double entry system used all over the world is no doubt, attributable to the wonderful work of Pacioli in 1494. The double entry system, according to Mike & Fred (1983) was developed to ensure that every transaction has equal and opposite reaction. Perera and Mathews (1996), opined that the initial development of double entry system of

accounting in the Italian city states suffered stagnation for a considerably long period of time prior to Pacioli's treatise resulting its non-acceptance in England, Germany, France, and even in Italy.

Advanced production techniques, ownership and control of assets as well as methods of providing for depreciation were based on accounting assumptions, (Ola, 1985) hence, the charge and discharge system could not meet the aggregation of capital equipment, calculation of product costs, inventory valuation, and income determination. If for instance, depreciation is not charged in a given period, the implication is that costs will be understated and profit will be overstated. Therefore, dividend would be paid out of capital. Recall that prior to the introduction of company taxation; the early theories of depreciation including replacement cost accounting stipulated that there was no need for depreciation if assets were maintained in good condition. The aftermath of this theory is better imagined. The industrial revolution, coupled with the economic and legal changes associated with it, especially the aggregation of capital, labour and company legislation brought pressure on the accounting systems that would favourably settle the various parties. However, according to (Dopuch and Sunder, 1980), the accounting system that could address the aggregation of capital, methods of labour remunerations, depreciation of assets, production cost, and income determination was developed. Similarly, Bierman and Drebin (1972) observed that there were yearnings for a consensus on the nature and application of Generally Accepted Accounting Principles (GAAP) in given nation, yet no proper response or attention was given. Consequent upon the fall out of the great economic depression, the development of a framework of principles to facilitate the preparation of financial statements was given attention by the US government in 1934. As a result of this, the Security and Exchange Commission (SEC) was established in 1934 and charged with the responsibility of prescribing the principles to be applied by the American Accounting Professionals in the preparation of financial statements. However, the American Institute of Certified Public Accountants through its committee on Accounting Procedure (AP) established in 1938 took a more positive and pragmatic approach towards the establishment of a more coherent set of accounting principles.

### 3. Summary and Conclusion

This paper has presented a critical review of Luca Pacioli's double entry system of accounting. It examined the evolution of double entry system of accounting, the development of double entry system of accounting, Luca Pacioli's contribution towards the development and spread of double entry system of accounting, Pacioli's impact on the accounting practice of his time, and the corollary of double entry system of accounting. The historical evolution of double entry system of accounting provides an explanation to most of the important events that characterized the rise of double entry bookkeeping and the development of modern accounting. It will increase the ability of potential accountants and others who are interested in the accounting discipline to make their judgments on a broader and more informed basis. It enables us to establish a relationship between past accounting practices, what the practice is now, and what it ought to be. The rapid growth in business that culminated into industrial revolution was what compelled accounting to move to another stage of development often referred to as the 'charge' and 'discharge' system of bookkeeping. This system however did not facilitate the determination of profit because it lacked the method of inventory valuation, cost ascertainment, and provision for depreciation. The emergence of double entry system was among other things, to minimize fraud, errors, misappropriation and pilfering of assets. It also built enormous confidence on equity owners on the works and reports of management upon whom the capital assets of the owners are entrusted. Thereafter, the issue of Generally Accepted Accounting Principles came up. As a matter of fact, this was the period when business owners entrusted their resources to management for the purpose of achieving set objectives. Later on auditing and investigation emerged. This development was born out of the resolve that the conflict among the users of financial statements must be resolved. Furthermore, it is a fact that the introduction of accounting packages and information technology into the business world has simplified the production of financial reports at minimum cost, high speed, and accuracy.

Accounting like business and economics or any other system has experienced changes, modifications, updates and improvement in recent years. The situation is however, better off now than before because of the introduction of regional grouping, international accounting standard committee, exposure draft and statement of intent, including the availability of research institutes. The beauty of accounting today would not have been what it is but for the wonderful work of Luca Pacioli. As a matter of fact, the principles and practice of double entry bookkeeping were documented, preserved and 'transported' to our time through Pacioli. Though he never laid claim to the invention of the all embracing double entry system of accounting, researches have shown that he laid the stepping stone hence, his recognition as the father of modern bookkeeping.

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