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Why accounting systems matter for data quality

Alessandro Avenali

Sapienza University of Rome, Italy
alessandro.avenali@uniroma1.it

Higher Education Institutions (HEIs) and financial information

- Data are crucial to analyze, describe and evaluate institution of higher (tertiary) education and research
  - To understand how universities produces their services
  - To identify proposals and suggestions for university reforms
- There are a lot of different data categories which can be taken into account to study universities
  - For instance, data: on main university descriptors, on academic degrees delivered in distinct fields of education, on students enrolled, on graduates, on research activities, on academic and administrative staff, etc.
- In particular, financial data have attracted a lot of attention during the last decade
  - The financial sustainability of universities is of crucial importance. Only institutions that know the full costs of their activities and projects can
    - Judge if they are able to operate on a financially sustainable basis
    - Compare themselves with other universities in order to find activities where efficiency can be improved
    - Define a focused strategy to stop spending beyond their means
  - Financial resources can strongly affect the competitive positioning of the universities in the worldwide higher education industry
    - Globalization → stronger international competition for universities in attracting students and external funds for large research projects → higher education institutions are responding by trying to get the image of the world-class university
    - Key pillars for a world-class university: Teaching , Research, Knowledge Transfer, Global Outlook → the linchpin of these key pillars can be found in some indicators based on financial data

Accounting systems

- Let us first clarify which data we are talking about

- An accounting system is a tool, based on methods or procedures, that is employed in an organization to produce, manage and maintain financial data (i.e. related to facts that can be expressed in terms of money)

- In particular, an important part of the gathered information can be presented in the effective form of Financial Statement

Financial Statement and its purposes

- A Financial Statement is a particular quantitative way of showing what an organization is doing
- The collected financial information is exploited to generate three different sets of information
  - Assets versus funds → Balance Sheet (or Statement of Financial Position)
    - How large are the organization assets? How much debt does the organization have?
  - Profitability or financial sustainability → Income Statement (or Profit and Loss Account or Statement of the Comprehensive Income)
    - Is the organization making wealth? Is the organization profitable or not?
  - Cash management → Cash Flow Statement
    - Can the organization meet its obligations? Does the organization have enough cash to run the business?

Drawing up a Financial Statement

- Specific accounting concepts are applied to draw up a Financial Statement
- Financial Statement also includes a document where accounting concepts and details underlying the three quantitative reports are provided → Notes to the Account
- Many of these concepts are common across the accounting systems of different countries
- However, a few concepts may be applied in different ways. Thus, it might be complex compare data from different accounting systems

Balance Sheet

- It is an instant picture (a snapshot) of the assets of the organization and of the funds related to these assets
  - It lists assets and funds
  - It is a static document (unlike Cash Flow Statement and Income Statement)
  - Pictures are taken repeatedly (usually at fixed intervals) to see how assets and funds change over time
- Assets (or Uses or Uses of Capital or Uses of Funds): a list of items of value owned by the business, namely, the economic resources under the control of the organization. Examples of assets include
  - Land and Capital Equipment
  - Intellectual Property (if purchased or produced)
  - Cash
  - Accounts Receivable
  - Inventory
- Funds (or Sources or Sources of Capital or Sources of Founds or Claims): a list of amounts due to parties that are external to the organization
  - Liabilities: a list of amounts due to third parties that are external to the organization. Examples of Liabilities include
    - Short Term Debt (loans, etc.)
    - Long Term Debt (loans, bonds, etc.)
    - Accounts Payable
    - Taxes Payable
  - Net Assets (or Ordinary Funds or Common Funds): it includes the amounts due to the owners/institutional stakeholder to start the business activities

Balance Sheet

- Money measurement concept
  - Every asset and every fund is measured in terms of its monetary value
  - There is unique method of measurement (one metrics): the currency

- Dual aspect concept
  - Assets = Liabilities + Net Assets
  - Net Assets (funds due to owners) is set equal to the difference between Assets and Liabilities

Balance Sheet

- Tangible assets
  - They are physical asset (e.g. cash, inventory, buildings, vehicles, equipment)
- Intangible assets
  - They do not exist in physical form (e.g. concessions, licenses, trademarks, patents and intellectual property rights, accounts receivable)
- Fixed assets
  - Intangible assets with a multi-year lifetime (patents, licenses, etc..)
  - Tangible assets with a multi-year lifetime (land and buildings, plants, facilities, computers, office equipment, etc.)
  - Long-term investments (long-term holdings of shares in companies for trading purposes, etc.)
- Depreciation
  - The cost of assets can be expensed each year over the life of the asset → depreciation is an accounting procedure to spreads out the cost of an asset
  - Determine the useful lifetime for the assets and the salvage value
  - Decide which method of depreciation the organization wants to use (Straight Line or Accelerated)
  - Continue depreciation on items purchased in earlier years, using previously established methods
  - The write-off of intangible long-lived assets is usually referred to as Amortization instead of Depreciation
    - This different terminology is used as typically there is no salvage value and the straight line basis is applied, that is, the same amount is expensed in each period over the useful lifetime of the asset (e.g. for trademarks, patents)
- Intangible and tangible fixed assets are also stated net of accrued depreciation

Example of Balance Sheet

Massachusetts Institute of Technology (MIT) - USA	2,018
Balance Sheet	(in euros)

Assets	
Cash and cash equivalents	393,787,600
Accounts receivable, net	214,422,560
Pledges receivable, net, at fair value	515,330,640
Contract in progress, principally US government	91,007,320
Deferred charges, inventories, and other assets	270,711,840
Student notes receivable, net	28,042,520
Investments, at fair value	19,084,271,160
Intangible and tangible fixed assets, net	3,389,626,840
Total assets	23,987,200,480

Liabilities	
Accounts payable, accruals, and other liabilities	448,005,040
Deferred revenue, advance payments and other credits	550,851,840
Borrowings, net of unamortized issuance costs	2,998,637,880
Government advances for student loans	21,814,120
Other liabilities	172,453,080
Total liabilities	4,191,761,960
Net assets	
Total net assets	19,795,438,520
Total liabilities and net assets	23,987,200,480

Income Statement

- Income Statement describes the profitability/sustainability of the organization
  - It measures the profits and the losses from all operations on a year basis
  - To do this, it measures all revenues and deducts all expenses

- The key elements are revenues and expenses
  - Revenues: Increases in economic benefits (creation of wealth)
    - Usually, the amount invoiced for the services/goods sold and delivered to clients in the considered account period
  - Expenses: Decreases in economic benefits (consumption of wealth)
    - Usually, those costs that relate directly to the revenue (e.g. direct cost of the services/goods sold) + those costs that relate to the considered account period
  - Both Revenues and Expenses are calculated according to strict accounting rules
    - In particular, profit and loss account relies on the accrual concept. Under the accrual based accounting, a transaction is recorded when it occurs, without waiting until cash is paid out or received

- Total (yearly) revenues minus total (yearly) expenses is defined as
  Net Earnings or Net Income or Earning After Tax (EAT)

- Dual aspect concept → Net Assets (due to owners) is set equal to the difference between Assets and Liabilities
  - After running business activities, if assets and liabilities are not equal, a residual amount (>0 or <0) for net assets will be reported
  - The excess of income over expense translates into an increase in the net assets (the excess of assets over liabilities) and vice-versa

Example of Income Statement

Massachusetts Institute of Technology (MIT) - USA	2,018
Income Statement	(in euros)

Operating revenues	
Tuition and similar revenues	325,423,320
Research revenues	1,568,862,200
Gifts and bequests for current use	202,602,400
Fees and services	193,474,160
Other programs	70,771,920
Support from investments	765,118,000
Auxiliary enterprises	121,293,720
Net asset reclassifications and transfers	88,964,920
Total operating revenues	3,336,510,640
Operating expenses	
Salaries and wages	1,353,791,960
Employee benefits	308,876,200
Supplies and services	1,009,559,240
Subrecipient agreements	136,165,520
Utilities, rent, and repairs	207,825,240
Depreciation	164,339,600
Interest expense	111,089,080
Total operating expenses	3,291,646,840
Result of operations	44,863,800
Non-operating activities: revenues/expenses	
Pledge revenue	172,157,760
Gifts and bequests	59,174,400
Investment income	3,528,200
Net gain on investments	2,194,753,840
Distribution of accumulated investment gains	-613,682,320
Other changes	75,509,000
Postretirement plan changes other than net periodic benefit cost	353,045,400
Net asset reclassifications and transfers	-88,964,920
Total non-operating activities	2,155,521,360
Increase in net assets (due to all activities) - net earnings	2,200,385,160

Cash Flow Statement

- A report of all the transactions of the organization that involve cash
  - Compare the sum of the cash in to the sum of the cash out on a year basis
  - It describes where cash came from and where it went
  - It provides information about three categories of activities which cause cash flows
    - Cash flows from operating activities come from the day-to-day operations of the organization's businesses
    - Cash flows from investing activities result from buying or selling long-term assets
    - Cash flows from financing activities result from obtaining or paying back funds used to finance the organization's businesses

- The key elements are
  - Money flowing in (when cheques are received)
    - Cash in, cash inflows, takings or collection
  - Money flowing out (when cheques are issued)
    - Cash out, cash outflows

- The final result is Net Cash Flow (total cash inflows net of total cash outflows)

Example of Cash Flow Statement

Massachusetts Institute of Technology (MIT) - USA	2,018
Cash Flow Statement	(in euros)

Cash Flow From Operating Activities	
Increase in net assets	2,200,385,160
Adjustments to reconcile change in net assets to net cash used in operating activities	
Net gain on investments	-2,194,753,840
Depreciation	164,339,600
Amortization of bond premiums and discounts and other adjustments	-354,539,480
Change in operating asset and liabilities	
Pledges receivable	-24,761,800
Accounts receivable	-6,826,400
Contracts in progress	-15,260,040
Deferred charges, inventories, and other assets	32,499,920
Accounts payable, accruals, and other liabilities, excluding building and equipment accruals	41,746,840
Deferred revenue, advance payments and other credits	16,192,920
Other (reclassifications)	-192,758,400
Net cash from operating activities	**-333,735,520**

Cash Flow from Investing Activities	
Purchase of intangible and tangible fixed assets	-447,499,960
Purchases of investments	-30,316,758,160
Proceeds from sale of investments	30,970,475,200
Student notes issued	-5,003,880
Collections from student notes	10,758,480
Net cash from investing activities	**211,971,680**

Cash Flow from Financing Activities	
Contributions restricted for long-term investment	179,894,960
Proceeds from sale of donated securities restricted for endowment	9,335,240
Increase in investment income for restricted purposes	3,528,200
Proceeds from borrowings	0
Repayment of borrowings	-24,380,000
Decrease in government advances for student loans	-5,799,680
Other	-14,866,280
Net cash from financing activities	**147,712,440**

| **Net increase/decrease in cash** | **25,948,600** |

Exploiting data from Financial Statement

- Data from Financial Statement provide quick evaluations of the economic health and performance of an organization
  - From balance sheet and income statement and cash flow statement amounts

- For instance, when the performance in terms of profit of an organization has to be examined, we should look at the absolute value of the generated net profit (Net Earnings) in relation to the asset tied up in the business

Shanghai Ranking

- As anticipated, data from financial statement may be used to «measure» the capacity of a university of competing in the worldwide higher education sector
- Now we can see an example
- Shanghai Ranking, year 2018 (http://www.shanghairanking.com/ARWU2018.html)
  - Alumni: Alumni of an institution winning Nobel Prizes and Fields Medals
  - Award: Staff of an institution winning Nobel Prizes and Fields Medals
  - Hici: Highly Cited Researchers
  - N&S: Papers published in Nature and Science
  - PUB: Papers indexed in Science Citation Index-Expanded and Social Science Citation Index
  - PCP: Per capita academic performance, the weighted scores of the above five indicators divided by the number of full-time equivalent academic staff

Some universities in the ranking: specific data from financial statements

year 2018 (in euros)	Harvard University	MIT	Princeton University	Sapienza University of Rome	University of Milan	University of Pisa	Vanderbilt University	Boston University	Carnegie Mellon University
HEI									
country	USA	USA	USA	Italy	Italy	Italy	USA	USA	USA
ranking position (2018)	1-10	1-10	1-10	151-200	151-200	151-200	50-100 (50)	50-100 (70)	50-100 (91)
students	31,566	11,574	8,374	100,274	60,641	44,275	12,824	34,657	14,029

data from finalcial statements									
total assets	52,208,418,520	23,987,200,480	29,055,486,920	1,278,168,146	926,316,335	817,999,746	6,639,461,520	5,888,265,880	3,749,714,840
of which: intangible and tangible fixed assets, net	7,113,598,240	3,389,626,840	3,809,996,000	390,109,073	307,979,203	412,536,997	1,006,131,320	2,403,481,600	888,659,280
of which: cash and cash equivalents	133,383,440	393,787,600	21,371,600	696,333,194	378,492,579	232,888,534	554,439,840	136,849,080	442,784,960
total net assets	43,207,049,280	19,795,438,520	25,203,908,760	652,444,837	531,473,824	450,583,092	5,788,355,720	3,608,937,360	2,935,508,400
total liabilities	9,001,369,240	4,191,761,960	3,851,578,160	625,723,309	394,842,511	367,416,654	851,105,800	2,279,328,520	814,206,440
of which: borrowings, net of unamortized issuance costs	4,876,847,320	2,998,637,880	3,055,543,560	23,002,244	2,659,851	63,712,005	231,124,240	1,315,527,320	502,586,800
operating revenues	4,798,093,480	3,336,510,640	1,864,205,200	783,678,965	529,479,233	351,979,718	1,256,983,120	1,856,863,600	1,208,294,880
operating expenses	4,617,440,440	3,291,646,840	1,580,695,240	705,617,120	488,156,524	334,036,039	1,107,059,000	1,724,445,240	1,094,766,880
investment in intangible and tangible fixed assets (purchases)	862,724,480	447,499,960	215,957,120	13,040,809	58,415,339	19,115,707	144,030,600	178,396,280	136,339,400
investments in financial activities (purchases)	13,497,785,520	30,316,758,160	12,596,852,520	4,000,000	40,000	160,866	7,304,557,120	1,923,092,560	1,118,528,640
investments, all (purchases)	14,360,510,000	30,764,258,120	12,812,809,640	17,040,809	58,455,339	19,276,573	7,448,587,720	2,101,488,840	1,254,868,040

Indicators based on data from financial statements

year 2018 (in euros)	Harvard University	MIT	Princeton University	Sapienza University of Rome	University of Milan	University of Pisa	Vanderbilt University	Boston University	Carnegie Mellon University
HEI									
country	USA	USA	USA	Italy	Italy	Italy	USA	USA	USA
ranking position (2018)	1-10	1-10	1-10	151-200	151-200	151-200	50-100 (50)	50-100 (70)	50-100 (91)
some indicators									
total assets per student	1,653,945	2,072,507	3,469,726	12,747	15,275	18,475	517,737	169,901	267,283
intangible and tangible fixed assets per student	225,356	292,866	454,979	3,890	5,079	9,318	78,457	69,351	63,344
operating revenues per student	152,002	288,276	222,618	7,815	8,731	7,950	98,018	53,578	86,128
operating expenses per student	146,279	284,400	188,762	7,037	8,050	7,545	86,327	49,757	78,036
purchases of intangible and tangible fixed assets per student	27,331	38,664	25,789	130	963	432	11,231	5,147	9,718
purchases of investments (all) per student	454,936	2,658,049	1,530,070	170	964	435	580,832	60,637	89,448

- It seems that indicators based on financial data can approximately reproduce the Shangai Ranking (thus without looking at Alumni, Award, etc.)
- It seems that a **necessary** condition to make a university great in the world (a world-class university) is providing the university with a sufficiently high level of financial resources
  - For instance, many financial resources allow
    - To buy best equipments and laboratories to make research
    - To hire the best professors in the worlds to teach and to make research
    - Etc.
  - Obviously, it is not a sufficient condition as the university could spend in a bad way the financial resources

Some databases including financial data

- Data provided from accounting systems are important and then should be collected and monitored for each university

- In USA there is IPEDS - American Database for HEIs
  - https://nces.ed.gov/ipeds
  - IPEDS is the Integrated Postsecondary Education Data System. It is a system of interrelated surveys conducted annually by the U.S. Department of Education's National Center for Education Statistics (NCES). The Higher Education Act of 1965, as amended, requires that institutions that participate in federal student aid programs report data on enrollments, program completions, graduation rates, faculty and staff, finances, institutional prices, and student financial aid

- In Europe there is ETER - European Database for HEIs
  - https://www.eter-project.com/#/home
  - The European Tertiary Education Register is a database collecting information on HEIs in Europe, concerning their basic characteristics and geographical position, educational activities, staff, finances and research activities
    - Essentially, ETER provides data at the level of individual HEIs, complementary to educational statistics at the country and regional level provided by EUROSTAT

- However, financial data are not simple to collect in a homogeneous way for HEIs of different countries, as they are generated with different accounting systems

IPEDS - Groups of variables

- https://nces.ed.gov/ipeds/use-the-data/survey-components
- https://nces.ed.gov/ipeds/use-the-data
- Level of analysis is institution
  - Multi-institution or multi-campus organizations may report at system-level or campus-level for some variables (e.g. Barkley is a part of the university of California system)
  - No student-level data are provided

- IPEDS collects data on postsecondary education in the United States in eight areas (related to major topics)
  - Institutional Characteristics and Institutional Prices
  - Admissions
  - Enrollment (Fall and 12-Month)
  - Degrees and Certificates Conferred (Completions)
  - Student Persistence and Success (Graduation Rates and Outcome Measures)
  - Student Financial Aid
  - Institutional **Resources** (**academic libraries, finance, human resources**)

IPEDS - Institutional Resources - Academic Libraries

- IPEDS collects information on collections, services, and expenditures at libraries at degree-granting institutions
- Data collected include
  - Counts of books, media, serials, and database collection held in the physical and digital/electronic form
  - Physical circulation and digital/electronic usage
  - Interlibrary loan services (if library expenditures >$100,000)
  - Library expenditures (if library expenditures >$100,000)
- Institutions with annual library expenditures less than $100,000 are only required to report collections, circulations, and services information (digital/electronic usage)

IPEDS - Institutional Resources - Human Resources

- Human resources data measure the number and type of staff supporting postsecondary education. Because staffing patterns vary greatly across postsecondary institutions, IPEDS uses the Standard Occupational Classification (SOC) System to collect occupational activity
- Data collected include
  - Number and salaries of full-time non-medical instructional staff
  - Number of full-time instructional staff by academic rank, faculty and tenure status, race/ethnicity and gender
  - Number and salary outlays of full-time non-medical non-instructional staff by occupational category
  - Number of full- and part-time medical and non-medical staff by occupational category, faculty and tenure status
  - Number of full- and part-time staff by occupational category, race/ethnicity and gender
  - Number of new hires by occupational category, race/ethnicity and gender

IPEDS - Institutional Resources - Finance

- Finance data provides context for understanding the resources and costs of providing postsecondary education
- Data collected include
  - Assets and Liabilities
  - Revenues by source (e.g., tuition and fees, government grants and contracts, private gifts)
  - Expenses by function (e.g., instruction, research, academic support, institutional support)
  - Scholarships and fellowships data
  - Different forms used based on the institution's accounting standards GASB and FASB. IPEDS collects finance data conforming to the accounting standards that govern public and private institutions. Generally, private institutions use standards established by the Financial Accounting Standards Board (FASB) and public institutions use standards established by the Governmental Accounting Standards Board (GASB)
    - Public Government Accounting Standards Board (GASB) reporters
      - Endowments
      - Pensions
    - Private not-for-profit Financial Accounting Standards Board (FASB) reporters
      - Endowments
    - For-profit reports
      - Income Tax

ETER - Groups of variables

- https://www.eter-project.com/#/search

- ETER collects data on postsecondary education in Europe in ten areas
  – Basic institutional descriptors
  – Geographic information
  – Educational activities (students and graduates)
  – Research activities
  – **Expenditures**
  – **Revenues**
  – Staff
  – Demographic events
  – Erasmus students
  – Indicators

ETER - Expenditures

- Data collected include
  - Personnel expenditure, non-personnel expenditure
  - Expenditure unclassified
  - Total current expenditure
  - Capital expenditure
  - Accounting system of capital expenditure
  - Notes on expenditure

ETER - Revenues

- Data collected include
  - Basic government allocation, other core budget, total core budget
  - Public third-party funding, private third-party funding
  - Third-party funding from abroad, third party funding unclassified, total third party funding
  - Tuition fees
  - Student fees funding
  - Revenues unclassified
  - Total current revenues
  - Non-recurring revenues
  - Notes on revenues

Several critical «measurement» problems have to be addressed (1)

- Many universities do not own all the resources they use
  - For instance, they may not own some buildings for the administrative staff, some facilities for the students, some equipments for laboratories
- Depending on the accounting rules, the value of not-owned resources may or may not be reported in the balance sheet

- Thus, two universities which in theory use an equivalent set of resources may appear different by looking at the data provided by accounting systems in the case one purchases the resources and the other one rents them
- For instance, university accounting system should be required to provide all the details on long-term rentals of multi-year lifetime resources in such a way that
  - Each rental can be virtually transformed into an equivalent purchase by determing depreciations and interests starting from the expected rental charges defined in the rental contract of the resource
  - The amount of the residual depreciations can be added to the intangible and tangible fixed assets

Several critical «measurement» problems have to be addressed (2)

- Some resources used by universities may belong to the responsible public authority in charge of the university
  - Specially buildings
- This authority may put these resources at the universities' disposal free of charge or at a symbolic low charge
- As a result, the corresponding expenditures do not appear in the income statement or appear with a low value
- On the contrary, some universities (specially the old ones) uses premises situated in buildings listed as historical monuments and under special protection. In this case costs in the income statement are much higher than for premises in new buildings

- In some cases it would not be correct to charge little expenses to the university activities while in other cases it would not be correct to charge all the expenses entirely to the university activities
- Thus, universities which in theory use an equivalent set of resources may appear different by looking at the data provided by accounting systems in the case that expenses for the rents of premises are underestimated/overestimated
- A very hard problem to overcome with a general approach. A case-by-case analysis could be necessary

Several critical «measurement» problems have to be addressed (3)

- As seen, intangible and tangible fixed assets are stated net of accrued depreciation in the balance sheet
- Different universities may apply different depreciation methods and/or different useful lifetime for these fixed assets

- Thus, universities which in theory use an equivalent set of resources may appear different by looking at the data provided by accounting systems in the case that resources with multi-year lifetime are purchased and depreciation is differently computed
- In principle, university accounting system should be required to provide accounting data on intangible and tangible fixed assets by first fixing the depreciation method and the useful lifetime at least for the main asset categories

Several critical «measurement» problems have to be addressed (4)

- There are different ways of updating the values of intangible and tangible fixed assets
  - cost method: essentially, historical cost of the asset net of accrued depreciation (as determined at the beginning)
    - Assets enter in accounting records at the price paid to acquire them and are not re-evaluated (except for depreciation)
  - fair value: essentially, the last updated value of the asset net of accrued depreciation (as determined after the last update of the value)
    - At the beginning, historical cost is applied. Then, at the end of established periods (e.g. at the end of every two years) the initial value of the asset (i.e. gross of accrued depreciation) is updated with a rational estimate of the potential market price of the asset (i.e. the price at which the asset can be sold in an orderly transaction to a third party under current market condition)
- Different universities may apply cost method or fair value for intangible and tangible fixed assets

- Thus, two universities which in theory use an equivalent set of resources may appear different by looking at the data provided by accounting systems in the case that one applies the cost method and the other one the fair value for intangible and tangible fixed assets
- For instance, universities accounting systems should be required to also provide accounting data on intangible and tangible fixed assets which are consistent with the easier cost method

Several critical «measurement» problems have to be addressed (5)

- Some universities are multi-business. In particular, there is the main business of providing higher education and research services but there can also be the business of providing health services

- In this case, assets, funds, revenues, costs, cash in-flows, cash out-flows can be jointly provided by the accounting system. Thus, it may be impossible to separate ex post data

- Thus, two universities which in theory use an equivalent set of resources for the main business of higher education services may appear largely different by looking at the data provided by the accounting systems in the case that one owns an hospital

- For instance, university accounting systems should be required to provide accounting data on assets, revenues, expenses, operating and investment cash in-flows, operating and investment cash out-flows separately for the two businesses

Several critical «measurement» problems have to be addressed (6)

- Some costs can depend on country laws
  - Different tax regimes
  - Mandatory insurances
- Expenses in financial statement can be misrepresented by these items

- To fairly compare expenses of distinct HEIs, university accounting systems should be required to also provide all expenses which strictly depend on specific country laws

Several critical «measurement» problems have to be addressed (7)

- Under an accrual-based accounting system, a transaction is recorded when it occurs, without waiting until cash is received or paid out
- Thus, cash inflows/outflows and revenues/costs are distinct concepts. For instance
  - Payments to suppliers for goods received are not costs, simply cash outflows. Costs are incurred when these goods (as productive inputs) are consumed in the production processes
  - Clients do not always pay in cash what they buy. In this case, the organization register a revenue, but it is owed money and has an account receivable (it will receive money later)
  - Cash for the purchasing of an asset is not a cost. Costs are the corresponding depreciations
  - Organizations do not generally pay cash for materials. If this is the case, the organization has an account payable (it will pay money later)
- However, some universities relies on a cash-based accounting system, which records income when cash is received and costs when cash is paid

- Universities applying cash-based accounting should be required to switch from cash-based to accrual-based accounting (as the accrual basis provides a more realistic view of profit and loss during a period of time). Generally, this change requires a big effort from these institutions
- For example, over the past years some countries have updated the public law to force the university system to switch from cash to accrual account (Belgium, Italy)

Concluding remarks

- There are problems and approximations in comparing financial data from different accounting systems

- However, when possible, data from financial statement should be taken into account into quantitative analyses on HEIs since they can help to explain differences

- We should push as much as possible to gather financial data in such a way the described problems are mitigated/solved

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