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Libraries and correlated organizations outputs and outcomes

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Abstract

The paper examines the problems of measurement of outcomes and outputs of libraries, institutional repositories of online publications and documentation centres and services.

Libraries and correlated organizations produce services for culture, learning, research and productions of administrations and business activities. Users of these services are households, universities, schools, research centres, administrations and industries. The outputs can be classified as final consumptions, investments (included human capital), intermediate consumptions, auxiliary activities, and are generally evaluated by the yearly costs of productions as users do not directly pay for the services.

Since libraries and correlated organizations often cooperate especially when online and connected in a worldwide network, assuring the preservation of knowledge and culture and offering their services to third parties, their outcomes are distributed in space and time and are not directly correlated to national yearly output costs, thus needing a specific measurement and evaluation method.

Libraries: from antiquity to the Knowledge Society

Libraries were born after the invention of writing to preserve and make available to a multitude of individuals¹ literary works intended by their authors for a multitude of unknown readers², both present and future. Before the invention of printing, libraries acted as publishers since copyists reproduced the available works both for individuals (first of all the library owner) or other libraries. After the invention of printing, this function was taken over by publishers; the advent of electronic publications has given the publishing function to libraries and institutional web sites back again. The production of bibliographic metadata that can be shared and re-used on the web contributes to the creation of intangible goods that constitute the information assets. Thus library output is significantly changing not only in its services but also in its goods, costs, users and, consequently, its outcomes.

Deep transformations produced by the Internet

The advent of the Internet - open and generalist – has deeply innovated the way knowledge is circulated particularly via libraries and documentation services. The advent of the web has emphasized the innovations that did not emerged as far as the electronic versions of publications had been recorded on CD-ROMs or DVDs. These innovations have raised the “digital divide” issue for the countries which cannot afford them. These innovations have transformed the production of

¹ There have always been private libraries owned by a single person or family, but these will not be taken into account in this study.

² The multitude of unknown readers can be both effective and potential (this is the case of unpublished manuscripts). Documents intended for specifically identified or identifiable readers, if conserved as acts of the author, can be preserved as archival documents. They will not be taken into account in this study even when these documents represent the primary sources of historians' publications.

intangible goods, costs and services, bringing to a careful reconsideration of the measures of documentation and publishing output and its usage.

Online public access catalogues (OPACs) have been the first services offered online. Online catalogues, especially those of big libraries or huge libraries networks, also represent an easy tool to build bibliographies containing documents that are surely available. Since online catalogues are essential to guarantee library services to effective users and since the marginal costs to extend their usage universally are extremely low, they are generally publicly accessible. Moreover, free public accessibility to all Internet users improves the library owner image and keeps technical management simple.

Traditional libraries were mainly used by local communities and the researchers who wanted to know about the holdings of far away institutes had to move there and stay as long as they had finished their research, first to select relevant documents, then to consult them. Online catalogues permit users to access bibliographic information remotely and to check what is available in near or far away libraries. Users can easily reach and move to the libraries that are in the nearby, after having checked items availability and on condition that exchange agreements or common practices allow them to access different institutions. In alternative they can ask that the item is shipped to their own library to be checked out.³ Journal articles cannot be requested via inter-library loan since they cannot be lent. They are generally reproduced and shipped in photocopy or electronically via fax, e-mail, ftp, download (Document Delivery).⁴ The DD can also be used to request a copy of pages of books.

ILL and DD services of electronic publications are strictly monitored by commercial publishers. Indeed the re-distribution over the Internet of electronic publications is cheap and easy, jeopardizing the copyright of publishers and authors. Commercial publishers have often tried to distribute excerpts of their publications on their own. At first they thought they could take the place of library services selling pay-per-views, but they have quickly realized that the loss of the library market could not have been compensated by retail selling. On the other hand libraries cannot afford variable costs to make acquired contents publicly available, which represents their historic mission. In addition, commercial publishers cannot guarantee the long term preservation of their publications. The long term preservation should be delegated to public organizations or to research institutions that however can hardly take it on as long as copyright protection prevents them from using publications at an institutional level for such a long time.

While the production and distribution over the Internet of electronic publications costs little, long term preservation is very expensive, involving continuous migration from obsolete formats and standards to newer and supported ones. Scholars, such as Umberto Eco, think that works published before the digital era will be more easily accessible than those produced in electronic format today. The need for long term digital preservation forces towards cooperative agreements among libraries

³ This service is called ILL (Interlibrary Loan) and is based on reciprocal agreements among libraries, even on an international scale; the borrowing library is responsible for checks out and returns to the lending library on behalf of their patrons. Usually small fees are charged to refund service expenses, which is never a real payment generating a significant added value.

⁴ DD can be provided in a peering regime, charging service expenses only, or charging fees that generate a significant added value for the supplying library. This latter case has induced publishers to ask for royalty payments for the reproduced parts, backed by national or European legislation on Intellectual Property Protection (Intellectual Property Rights and copyright).

belonging to different institutions or even different countries, which obliges to a distribution of the costs of the conservation of cultural heritage.

Another innovation introduced by the Internet is the development of online information services or portals that offer access to the publications and data bases of their hosting institutions. Particularly relevant are those belonging to international organizations, government agencies and scientific societies. They publish reports, methodological guides, proceedings and staff papers. Often electronic publications anticipate print versions, are usually more complete and offer data that can be processed directly. The very shortcoming of these sites is represented by the fact that documents do not remain available in the long term and searching in the sites is not supported by catalogues that comprehend all bibliographic records, therefore obliging the reader to repeat his search using different tools. As a consequence, a solution may be to archive the digital contents produced by online documentation centres into library systems responsible for the digital legal deposit. Some institutes make their documents freely available, others charge subscription fees at least for their core documentation.

The most relevant innovation introduced by the web is the implementation and the diffusion of search engines that analyze the texts hosted in the web sites, index them and allow textual search, letting users retrieve and consult them online, either freely or according to the site access conditions. Besides generalist search engines, there exist specialized bibliographic versions that carry out services that are typical of libraries, such as for example Google Scholar and Google Book Search⁵. The number of results retrieved is so huge that ranking and ordering criteria become really important as the reader is not able to consult all the cited documents or even read all the references retrieved. Search engines do not charge for their information services and finance themselves selling their own software solutions and advertisements and even letting sponsors' sites come first in the result lists. Google Scholar has achieved an integration with a few library catalogues which permit to locate documents, especially print or copyrighted electronic ones. The latter are accessed under subscription by universities or university consortia which register in the catalogues the particular access conditions to the different commercial journals or electronic resources.

In conclusion, bibliographic information services are provided not only by libraries but also by a chain of different subjects that act according to different economic models. Libraries usually cooperate in networks, offering their services even to remote users who do not directly contribute to their financial support. In library practices free and toll services coexist even though the Internet pushes for free information services.

The value chain of research documents

The classic chain is: *research institution -> author -> publisher/printer -> distributor -> library -> reader*. Obviously certain passages can be either consolidated - when two roles merge or are skipped - when the reader buy a book in a bookshop or even from a publisher.

Yet, the author of technical publications is part of an institution that finances him, even when he is recognized as intellectually responsible for his work and the reader is a member of the same or another institution (he may also be a student) that can finance libraries and authors. The supply chain becomes circular with some contradictions when the publisher's mark-up is so high as to become oligopolistic for their articles ranking practices utilized by research funding bodies. For

⁵See <http://scholar.google.com/> and <http://books.google.com/> that offer advanced search tools typical of library catalogues.

example, if we take into account a number of articles that have the same scientific quality, we can obtain only a few for free or at average prices. The majority has prices that are so high that give oligopolistic multinational publishers a monopolist's income.

The necessity to spread and share the results of research and of public initiatives universally while refusing the oligopolistic price policies of big international publishers, has led many national and international universities and research institutes, either to support university presses with competitive policies⁶ or to publish their research production in digital format over the Internet using protocols that expose automatically subject metadata and make the full texts openly accessible. Consequently, digital libraries have become open access web sites and a specific declaration, signed in Berlin⁷, defines the principles of open access to research literature. The slow diffusion of open access publications is not caused by technical reasons or by the authors' economic interests - researchers are interested in the wide dissemination of their work and rarely receive royalties for their scientific publications. It is mainly due to the assessment criteria used by funding agencies when evaluating research projects. Indeed they prefer indicators produced by big commercial publishers, such as the Impact Factor⁸ that measures the weight of journals and not of single articles. Moreover IF can be altered by reciprocal citation practices among publishing groups, even when citations are not so relevant. By taking into account serials impact factor, universities, research institutions and their research funding bodies recognize publishers as having an exclusive role in article selection and peer reviewing. The relationship between publishers and research associations influences acceptance for publication.

The information sector and the information and documentation industry

To examine the information economy, it has been proposed to identify a macro-industry or productive information sector.

According to Schlögl & Hayes (2007) this sector can be divided into three segments, each of them includes several activities or industries of SNA classifications:

- information technology industries segment
- information transaction industries segment
- knowledge industries segment⁹.

⁶As an example, see the initiative of the Californian Universities and their The Berkeley Electronic Press (www.bepress.com/journals), founded by professors in 1999, The publisher says of himself: "*The Berkeley Electronic Press™ represents the new standard in scholarly publishing. Our journals feature fast and high-quality peer review, an innovative guest access policy, and prices that libraries can easily afford.*"

⁷"The **Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities** is a major international statement on [open access](#) / [access to knowledge](#). It emerged in [2003](#) from a conference on open access hosted in [Berlin](#) by the [Max Planck Society](#). Organizations that commit to implementing this definition of open access can sign on to the declaration. As of October 2007, more than 240 scientific organizations had signed the declaration.^[1]" (Wikipedia).

⁸ *Journal Impact Factor is from Journal Citation Report (JCR), a product of Thomson ISI (Institute for Scientific Information). JCR provides quantitative tools for evaluating journals. The impact factor is one of these; it is a measure of the frequency with which the "average article" in a journal has been cited in a given period of time. The impact factor for a journal is calculated on a three-year period, and can be considered to be the average number of times published papers are cited up to two years after publication. For example, the impact factor 2008 for a journal would be calculated as follows:*

A = the number of times articles published in 2006-7 were cited in indexed journals during 2008

B = the number of articles, reviews, proceedings or notes published in 2006-7

impact factor 2008 = A/B (<http://www.sciencegateway.org/impact/>)

⁹ The definition of these sectors and segments is given by Christian Schlögl and Robert M. Hayes (2007), p. 3:

Hayes specifies that: “*Libraries and information centers are included in knowledge industries with document and information management functions and processes which are connected with:*

- *documents selection*
- *documents acquisition*
- *documents description (metadata creation)*
- *documents preservation*
- *documents and information product creation*
- *documents and information services.”*

The choices and the actions of libraries are determined by the institutions that finance them and by the functions that they should provide.

The segments are created by grouping input-output industries. The absence of *Publishing, printing and reproduction of recorded media industry* in the *Knowledge industries* segment might be questionable. Some changes in the ISIC¹⁰ and CPC¹¹, currently under revision, could perhaps help.

Library ISO Sectors and Functions

International statistics for libraries are mainly disciplined by ISO 2789 *Information and documentation — International library statistics*, Fourth edition, 2006-09-15¹² that is generally used to define the methodologies for national and international surveys¹³.

Information technology industries

This segment includes industries that produce hardware and software for telecommunications, computers, and a variety of other technologies that acquire, communicate, and process data (such as medical and scientific instrumentation).

Information transaction industries

This segment includes those industries in which the primary emphasis is on the processing of transactions which represent actions taken but have substantive value only in that processing. This includes telecommunication services, banking and related financial activities, retail and wholesale transactions, reservation services (such as for hotels, air travel, autos, tourism), and a wide variety of similar transaction processing contexts.

Knowledge industries

This segment includes those industries in which the substantive content of the information is significant. It includes education, research and development, the professions (law, medicine, engineering, architecture, etc.), and what traditionally are called “Miscellaneous Business Services” (e.g., consulting, related services). Also libraries are an integral part of this segment.

In SNA sectors are institutional sectors and segment is no defined they are regrouping of industries or homogeneous branches .

¹⁰ ISIC Ver.4 (draft) Activity classification: <http://unstats.un.org/unsd/cr/registry/isic-4.asp>.

¹¹ CPC Ver.2 (draft): <http://unstats.un.org/unsd/cr/registry/cpc-2.asp>

¹² ISO 2789:2006 specifies rules for the library and information services community on gathering and reporting of statistics:

- for the purposes of international reporting,
- to ensure conformity between countries for those statistical measures that are frequently used by library managers but do not qualify for international reporting,
- to encourage good practice in the use of statistics for the management of library and information services, and
- to specify data provision required by ISO 11620.

ISO 11620:2008 (draft) *Information and documentation -- Library performance indicators*, specifies the requirements of a performance indicator for libraries and establishes a set of performance indicators to be used by libraries of all types. It also provides guidance on how to implement performance indicators in libraries where such performance indicators are not already in use. The list and descriptions of the performance indicators are also summarized.

The standard is not related to SNA and even the European LibEcon 2000 project refers exclusively to ISO 2789 without taking into account ESA and SNA although it has an explicitly economic objective and has been financed by the European Union. Differently from other surveys that require only specific costs such as those of collections and staff, LibEcon 2000 requires all operational and capital expenditures and it combines them with non-monetary information about inputs, outputs, collection assets and facilities

To define library output, it is necessary to use data according to ISO 2789 that requires to register expenditures and revenues in addition to physical data, even if in a shortened form, referring them to SNA and to its European version ESA. In SNA framework, library transactions are included in ISIC Rev.4, Section: **R** – “Arts, entertainment and recreation”, Division: 91 - *Libraries, archives, museums and other cultural activities*. Libraries are exclusively considered cultural and leisure services and not as means of diffusion of scientific and technical knowledge. It is to be noted that libraries and information services are not mentioned in the sections **J** - Information and communication, **M** - Professional, scientific and technical activities, **P** – Education. As a consequence, it is either difficult to classify libraries according to specific activities and specializations or to find an acknowledgment of library role as a class in information and documentation industry. Even functional classifications do not always help. The classification included in draft *Central Product Classification (CPC) Version 2*¹⁴ appears to be clearer and more useful. The Division **84** - Telecommunications, broadcasting and information supply services included in top level **8** - Business and production services is divided into the following Groups: **841** - Telephony and other telecommunications services, **842** - Internet telecommunications services, **843** - On-line content, **844** - News agency services, **845** - Library and archive services, **846** - Broadcasting, programming and program distribution services. The Group 443 is divided into the following Classes: **8431** - On-line text based information, **8432** - On-line audio content, **8433** - On-line video content, **8434** - Software downloads, **8439** - Other on-line content. The Group 445 is divided into the following Classes: **8451** - Library services, **8452** - Archive services. Class 8451 has only one sub-class: **84510** - Library services. The latter can be compared with ISO standards for

Other standards regarding library statistics have been developed for e-publishing services.

- [ISO/TR 20983:2003](#) *Information and documentation -- Performance indicators for electronic library services*;
- [ISO 9230:2007](#) *Information and documentation -- Determination of price indexes for print and electronic media purchased by libraries*;
- [ISO 9707:2008](#) *Information and documentation -- Statistics on the production and distribution of books, newspapers, periodicals and electronic publications* .

There are other standards and directives, in particular those edited by IFLA (The International Federation of Library Associations and Institutions <http://www.ifla.org/>) and the surveys carried out by ARL (Association of Research Libraries <http://www.arl.org/>).

¹³ See for example the European project LibEcon 2000: “A research study into international library economics” www.libecon.org; and statistical projects by IFLA (The International Federation of Library Associations and Institutions) <http://www.ifla.org/VII/s22/index.htm> .

¹⁴ On the UN Statistics Division site <http://unstats.un.org/unsd/cr/registry/cpc-2.asp>: *The technical editing of the Central Product Classification (CPC) Version 2 has been completed. In this process, a number of explanatory notes have been added (in particular in sections 0-4) or revised.*

The next step in the publication process is the submission of the full publication (including introduction etc.) to the UN editors. This will take place when the UN editors have finished their work on [ISIC Rev.4](#).

At that point, the CPC Ver.2 structure in the Classifications Registry will be updated and any previously published drafts will become obsolete.

After the review by the UN editors, the final version of CPC Ver.2 will be distributed. (22 May 2008)

information and documentation and particularly ISO 2789. The ISIC draft includes libraries in the leisure activities, the CPC draft in the knowledge services input for the productions of other goods and services or for final consumption. All physical libraries produce services included in 8451 Class; digital libraries or institutional repositories produce services included in 8431 Class. The CPC can be regarded as the classification that better fits professor Hayes' proposal or in any case the Knowledge economy. It could be very useful if ISIC took into account CPC criteria.

ISO ISO 2789 divides libraries in sectors and sub-sectors according to the main function attributed to them by administrators and requires the identification of administrative units. The identity of the owner institutions should be easily derived from the name of the administrative units. As a consequence, it is not difficult to cross-map them with SNA functions and sectors even if it does not always exist a distinction between public libraries and libraries belonging to social institutions that serve families. ISO defines library sectors¹⁵ and sub-sectors while SNA defines functions classifying expenditures according to objectives¹⁶.

Combining them with information about administrative units, it is possible to achieve a classification according to institutional sectors, industries and purpose functions typical of National Accounts, integrating thus library statistics in the framework of general economic and social ones.

The **national library** sector is formed by one or few units whose main function is to collect (often through legal deposit and so without costs), catalogue and conserve all the significant production published in a particular country, characterizing the national publishing economy¹⁷. Their function is typically accumulation both to conserve national cultural heritage and to produce bibliographies

¹⁵ To facilitate comprehension of the standard, accessible online only to subscribers, ISO 2789 sectors definitions are cited in note following the presentation of the different library sectors and sub-sectors in the text.

¹⁶The four Classifications of Expenditure According to Purpose of the 1993 SNA are:

1. [Classification of the Functions of Government \(COFOG\)](#) To classify the purpose of transactions such as outlays on final consumption expenditure, intermediate consumption, gross capital formation and capital and current transfers, by general government.
2. [Classification of Individual Consumption According to Purpose \(COICOP\)](#) To classify the purpose of individual consumption expenditures incurred by three institutional sectors, namely households, non-profit institutions serving households and general government.
3. [Classification of the Purposes of Non-Profit Institutions Serving Households \(COPNI\)](#) To classify the purpose of transactions such as outlays on final consumption expenditure, intermediate consumption, gross capital formation and capital and current transfers, by non-profit institutions serving households.
4. [Classification of the Outlays of Producers According to Purpose \(COPP\)](#) To classify the purpose of transactions in intermediate consumption and capital outlays of financial and non-financial corporate and unincorporated enterprises.

For classifications of products and activities see: <http://unstats.un.org/unsd/ct/registry/regct.asp?Lg=1>

¹⁷ **3.1.8 national library:** *library that is responsible for acquiring and conserving copies of all relevant documents in the country in which the library is located; it may function as a legal deposit library ...*

NOTE 2 A national library will also normally perform some or all of the following functions:

- *produce the national bibliography;*
- *hold and keep up to date a large and representative collection of foreign literature including documents about the country;*
- *act as a national bibliographic information centre;*
- *compile union catalogues;*
- *supervise the administration of other libraries and/or promote collaboration;*
- *coordinate a research and development service.*

NOTE 3 The definition of "national library" allows for more than one national library in a country.

which represent intangible goods. They typically belong to public administrations. They also offer consultation service to scholars and researchers.

Their COFOG functions are [08.2](#) - Cultural services, [01.4](#) - Basic research, while COICOP ones must be included into [14](#) - Individual consumption expenditure of general government that is divided into [14.3](#) - Recreation and culture and [14.4](#) – Education. Their output is included into the two final consumption categories: collective and individual. It is necessary to identify distribution criteria that should be proportional to costs (the cost of digital preservation is bound to increase) or uses (future ones in particular) or in a conventional way. However criteria should be internationally shared and codified to guarantee comparisons.

Regional libraries, recently established and hardly characterized¹⁸ yet, contribute to the conservation function together with national libraries. They often have historic origins and conserve ancient collections of certain value of a regional area. They belong to public administrations or to non-profit institutions. If regional libraries are part of private institutions, COPNI [03.2](#) – and COICOP [13.3](#) - Recreation and culture and [13.4](#) – Education should also be taken into account. It is to be noted that in COPNI the function “basic research” is not defined for private, non-profit institutions. On the contrary there are different categories for applied research and development (R&D), which creates some problems to the way private universities should be treated.

To complete the list of libraries whose main function is the conservation of collections (both printed and digital), we should mention **storage libraries or repositories libraries**, that are “librar[ies] whose primary function is to store less-used material from other administrative units”¹⁹. It is a new category introduced to classify entities that are emerging to cope with the massive production of documentations either printed or on other physical supports, both analogical and digital. In the period under examination, users services are few but functional classifications remain practically the same even though the distribution of weights appears to be reversed with reference to public libraries that are much more numerous and important.

The primary function of **public libraries** is to meet the information/reading demand either of the general public or of specific groups (i.e. prisoners or hospital patients) either for free or for a nominal fee (less than 50% of the costs). Public libraries can belong to public administrations or social institutions. They often support the education system. Public libraries best meet SNA specifications and in particular those of the activity ISIC [91](#) - Libraries, archives, museums and other cultural activities, of the above mentioned COFOG 08.2, COICOP 13.3 and 14.3 functions, and COPNI 03.2 - Cultural services. As secondary activities they support research and education activities that are typical of school and universities and research libraries. They also contribute to collection conservation. As a consequence part of their output should be attributed to the

¹⁸ **3.1.11.6 regional library:** *major library serving a particular region whose primary function cannot be described as that of a public, school or academic library nor as part of a national library network.*

In Italy regional libraries can include big historic libraries that had been the central libraries of the states before national unification; libraries belonging to princes or academies; libraries that have acquired the patrimonies of ecclesiastic institutions dissolved by Napoleon or of great families.

¹⁹ **3.1.12 storage library repository library:** *library whose primary function is to store less-used material from other administrative units.*

NOTE 1 Storage or repository libraries that are part of or administrated by another library (e.g. national or regional library) are excluded.

NOTE 2 Libraries whose stock remains the possession of the storing libraries are excluded. The collections and their use are counted with the proprietary libraries.

corresponding COICOP, COFOG and COPNI. Their relative weights can only seldom be assigned on the basis of costs which are combined together or on the basis of the services they offer which are never classified. It is necessary to refer to the categories of effective users that can be classified and recorded by library information systems or can be approximately derived from website log files. To this end it could be possible to add the appropriate definitions in the draft ISO 2146 on directories of library services.

The libraries attached to schools below the university level support the education system. **School libraries**²⁰ serve education activities (ISIC [P](#) - Education [85](#) – Education, this level has just one section) and the needs both of teachers and pupils. Their activities correspond to the functions of Education COFOG 10, COPNI 04 as regards the expenditures connected to educational services output (essentially those dedicated to teachers and school administrators). The expenditures included in family consumptions (parents and pupils) can be classified as COICOP [10](#) – Education (divided according to their level) if education expenditures are paid by families spending high fees. They must be included in CICOP 13.4 and 14.4 when they are paid respectively by public administrations and social institutions. School libraries can serve as public libraries for the general public's cultural consumptions as a secondary activity. In this case too the distribution of functional costs is made possible on account of effective users. In countries such as Italy, school libraries are often sparse or poor so public libraries usually take their place.

The sector “**library of an institution of higher education**”²¹ includes universities libraries serving students, academic and technical-administrative staff, but also serving the general public and in particular graduated professionals. Besides education function for the tertiary level or above, they serve basic research activities (COFOG [01.4](#)), and applied research (R&D) in the different functions and productive sectors (ISIC [M](#) - Professional, scientific and technical activities [72](#): Scientific research and development²², in particular, as regards health, by cooperating with hospital libraries). In ISO 2789 it is not clear whether even libraries belonging to public research institutes with no education activities should be attributed to this sector. Indeed they are not mentioned among special libraries, but could even be associated to university libraries on account of their role supporting research.

²⁰ **3.1.10 school library:** library attached to all types of schools below the third (tertiary) level of education whose primary function is to serve the pupils and teachers of such a school

NOTE 1 A school library can also serve the general public.

NOTE 2 This includes libraries and resource collections in all educational institutions below the third level, which can be described as “Colleges”, “Colleges of Further Education”, “Vocational Institutes”, etc.

²¹ **3.1.6 library of an institution of higher education:** library whose primary function is to serve students, academic and professional staff in universities and other institutions of education at the third (tertiary) level and above.

NOTE It can also serve the general public.

²² ISIC Rev.4 (draft) code [72](#): Hierarchy: Section: [M](#) - *Professional, scientific and technical activities*, Division: [72](#) - *Scientific research and development*, Groups: [721](#) - Research and experimental development on natural sciences and engineering, [722](#) - Research and experimental development on social sciences and humanities.

This division includes the activities of three types of research and development: 1) basic research: experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without particular application or use in view, 2) applied research: original investigation undertaken in order to acquire new knowledge, directed primarily towards a specific practical aim or objective and 3) experimental development: systematic work, drawing on existing knowledge gained from research and/or practical experience, directed to producing new materials, products and devices, to installing new processes, systems and services, and to improving substantially those already produced or installed. This division excludes market research (see class 7320).

ISO 2789 defines the “**special library**” sector in a way similar to that of “university library” on account of disciplinary and professional aspects: “*independent library covering one discipline or particular field of knowledge*”²³. It is to be noted that the standard specifies: “*The term special library includes libraries primarily serving a specific category of users, or primarily devoted to a specific form of document, or libraries sponsored by an organization to serve its own work-related objectives.*” Therefore, they primarily serve the financing organizations to which they belong and their activities are included in the classifications used in SNA mentioned above: ISIC, COFOG, COPNI, COPP²⁴; these libraries hardly serve the general public and their services are classified with COICOP. Special libraries mainly serve applied research, experimental development activities, documentation and vocational training needs of productive units rather than individual needs of single readers.

Special libraries²⁵ are differentiated according to funding institutions. These are the ISO sub-sectors:

- government library,
- health-service library, medical library,
- library of professional and learned institutions and associations,
- industrial and commercial library,
- media library,
- other special library (include: Library within voluntary organizations, museums, religious institutions).

Health-service libraries and medical libraries often cooperate with medical faculties libraries or are merged with them since hospitals can be both health care centers and medical schools.

²³ **3.1.11 special library:** independent library covering one discipline or particular field of knowledge or a special regional interest.

NOTE 1 The term special library includes libraries primarily serving a specific category of users, or primarily devoted to a specific form of document, or libraries sponsored by an organization to serve its own work-related objectives.

NOTE 2 The statistics of special libraries are generally collected and presented separately for those in the areas given in 3.1.11.1 to 3.1.11.7 (differentiated according to funding institutions).

NB It has been excerpted the 3.1.11.6 subsector related to regional libraries that have been set besides national ones. It appears to be too different from Special libraries sector.

²⁴ *Classification of the Outlays of Producers According to Purpose, (COPP): To classify the purpose of transactions in intermediate consumption and capital outlays of financial and non-financial corporate and unincorporated enterprises.* <http://unstats.un.org/unsd/class/family/family2.asp?CI=7>

²⁵ **3.1.11.1 government library:** library maintained to serve any government service, department or agency, or parliament, including both international, national and local (regional) government organizations.

3.1.11.2 health-service library medical library: library which serves health-service professionals in hospitals or elsewhere, whether in the private or public sector.

NOTE Pharmaceutical company libraries are generally included under 3.1.11.4.

3.1.11.3 library of professional and learned institutions and associations: library maintained by professional or trade associations, learned societies, trade unions and other similar bodies whose primary objective is to provide services to the members and practitioners of a specific trade or profession.

3.1.11.4 industrial and commercial library: library in any industrial enterprise or business firm, maintained by the parent organization to serve the information needs of its staff.

NOTE The term “industrial and commercial library” includes libraries maintained by information and management consultants, manufacturing and service industries and libraries of commercial legal practices.

3.1.11.5 media library: library serving media and publishing firms and organizations, including newspapers, publishers, broadcasting, film and television.

3.1.11.7 other special library: any library not included elsewhere, etc.

EXAMPLES Library within voluntary organizations, museums, religious institutions.

Libraries can be both physical or virtual. Physical libraries are single organizations with locations, technical equipment and facilities for their users. They have collections on physical supports (materials are usually printed but they can also be in magnetic-optical formats that must be consulted through proper workstations). Nowadays they are generally automated and have online catalogues (OPACs). Since both outputs and services are produced thanks to a heavy use of automation and software, they can be defined as electronic libraries. Digital libraries have full texts documents that can be read online. Physical libraries that provide both analogical and digital collections are called hybrid. Electronic libraries are visited by remote users who can request their services even if they do not belong to the library's patrons community. When reciprocal agreements or even mere common practices integrate different libraries in a grid (library cooperation) users can access to virtual libraries.

The term library (physical, digital or hybrid) also identifies the related organizations which include both the structures offering library services as secondary activities (it emerges again the concept of local unit for homogeneous production) and those structures that contribute to the production of services even if they do not possess autonomous collections, such as managers of union catalogues. In addition, there are the institutional and private information services that offer the materials and the data they publish for free or charging nominal fees. They are not formally catalogued or provided with metadata and they are retrievable via web links or search engines.

The commercial publishers' and distributors' web sites are to be excluded. They are commercial services to sell toll digital publications and data bases and represent only partially innovative forms of publishing distribution. Libraries often uses them to provide their patrons with web access points to the resources to which they have subscribed. Usually libraries control the access rights of users thanks to software applications provided in the contracts negotiated with the publishers. In this case the users services are owned by the library that pays for them as intermediate consumptions even when they are on the publishers' web pages.

ISO 2789 does not consider search engines as libraries even when they offer services typically bibliographic such as for example Google Scholar and Google Book Search. Since search engines are sometimes integrated with library catalogues and redirect users to catalogues in order to let them locate the retrieved documents, especially those that are not available online, ISO 2789 specifically requires to exclude the hits²⁶ generated by search engines from log sessions not to inflate data of single terms searches.

The case is different, even though not considered yet, for the requests of specific documents originated by local and national catalogues²⁷. It is clear that search engines and in particular the specialized ones offer bibliographic and documental services and they are not merely informative. As costs are covered by advertisements, services are free of charge for users and libraries who must only pay for Internet connections and computer equipments.

²⁶ See ISO 2789 paragraphs 3.3.25 e A5.5.4

²⁷ The University of Bologna maintains the Italian National Serials Catalogue (ACNP) together with CNR. In 2006 it was accepted Google's request to integrate the catalogue with Google Scholar. Therefore, when searching for a journal's article from an Italian internet node through Google Scholar, it is possible to find out the libraries that possess the journal by clicking on the button link ACNP that appears on the Google Scholar result list. The button link sends a query directly to the ACNP catalogue that returns the bibliographic record and the locations by clicking on the button link [ACNP Posseduto Biblioteche](#). In 2007 the number of requests coming from Google Scholar to the national catalogue was 110,579 of the total amounting to 1,906,426.

They also play a fundamental role in stimulating interlibrary collaboration. It is significant that library union portals host search boxes to search via search engines and uses catalogues to let users locate documents and check their availability or online accessibility, guaranteed by subscriptions paid by the single library, library systems, or consortia.²⁸

Indeed search engines are powerful tools that contribute to achieve one of the ideal objectives of libraries that is universal circulation of knowledge and information and the discovery and location of what is available, thus transforming publications from private economic goods into always available public goods (even when out of print or not particularly expensive for final interested users) that is non-monetary goods or accessible for nominal fees .

This transformation which cancels, or at least significantly reduces the monetary value of intellectual works even if it greatly increases their impact in a knowledge society, is achieved by supporting the expenditure of libraries as it happens with other consumptions that are financed by public administrations and social institutions. Just the costs of access or of remote reproduction (personal facilities) remain final or intermediate consumption. The effects of library activities become more relevant the greater the number of readers of each document available to them through libraries and the aggregated amount of consulted documents possibly weighted by quantitative and qualitative values. The Internet and the emerging of virtual libraries in a broad sense²⁹ have generated exchanges among institutional and economic units and import-export transactions to and from other economies, which have not been registered into national accounts.

A first consideration may be that, thanks to the containment of library and documentary services marginal costs³⁰ due to automation and mainly to the Internet and universal distribution of services, the values of library output are hardly correlated to the usage of library products or more generally of knowledge industry in the different economies. The outcomes for economy and society are much more related to the use of global supply rather than to the value of national output - but this is context-dependent. The Internet has promoted a series of free or almost free products because they have become communication languages and tools which are much more valuable the more they are circulated and they let circulate. For example a publication available open access online may increase more and more its impact while it will become less remunerative for the copyright holder. If the publishers' position is certain, except for those supporting themselves through advertisements, the authors' position is tormented by an internal conflict among real impact (how many effective readers), legal impact (that is the impact factor attributed to the journal where the article is published, which is one of the assessment criteria used by funding agencies), and intellectual protection rights (royalties made by publishers to authors) often only moral and not economic.

Libraries today play an important role in the diffusion of knowledge, but their services are not exclusive and outcomes are evaluated together with knowledge industries. In particular they contribute to the activities of the "*Knowledge workers and Information specialists*" group as it is mentioned by Hayes, R M.(2001) and Schlögl C. & Hayes R M, (2007).

Library ISO and professional statistics, as they are defined today and if related to SNA functional classifications, may permit to obtain the costs paid for library activities, relevant measures of the

²⁸ A library system is a coordinated group of libraries belonging to an institutional unit, such as for example a university. A university library system pays for campus subscriptions on behalf of faculty, students and staff or can join a consortium to negotiate common subscription conditions with big multinational.

²⁹ Included documentation sites and search engines.

³⁰ Often near 0 for the supplier.

production of goods and services in physical terms, and usage indicators, therefore offering a support to those who need to evaluate the effects on economy in general and in particular on those based on knowledge.

Yet, some difficulties derive from the very definitions and practices of National Accounting. In the information and knowledge economy, SNA does not define knowledge as an input yet and also information and documentation services are not in the industries classification. Moreover in the ISIC 4th draft, libraries are grouped with football clubs and not with search engines.

Library output in SNA

SNA rules on not-market output can either allow us the identification and evaluation of library output according the production costs or bring us to ignore it.

In SNA and in ESA, its European version, libraries are hardly defined as such, since, as we have seen before, they are aggregated to other activities, which makes it difficult to gather specific data on output, related costs and usages.

Libraries represent institutional units only if owned by institutions, such as foundations, that exclusively run one or more libraries. In this case, they are included mainly in the *Non-profit institutions serving households* (NPISHs) (S.15)³¹ sector. In the case of special libraries serving research activities or corporations, they should be attributed to the related sectors.

More often libraries are only one of the activities carried out within a single institutional unit. In this case, if libraries belong to institutional units offering individual consumption services to the general public, they should be considered as local kind-of-activity units (local KAU)³² in the NACE- rev.1 “92.51 Library and archives activities” class corresponding to ISIC Rev.3, 92.31.

This happens even when we properly classify the libraries that produce collective consumption services. The latter are services whose utility cannot be divided among population, such as for

³¹ ESA 1995: 2.87 . Definition: *The sector non-profit institutions serving households (NPISHs) (S.15) consists of non-profit institutions which are separate legal entities, which serve households and which are private other non-market producers (see paragraph 3.32.). Their principal resources, apart from those derived from occasional sales, are derived from voluntary contributions in cash or in kind from households in their capacity as consumers, from payments made by general governments and from property income.*

2.88 *The NPISHs sector includes the following main kinds of NPISHs that provide non-market goods and services to households: a) trade unions, professional or learned societies, consumers' associations, political parties, churches or religious societies (including those financed but not controlled by governments), and social, cultural, recreational and sports clubs; ... Sometimes public administration establish libraries as autonomous cultural institutes.*

³² 2.106 . Definition: *The local kind-of-activity unit (local KAU) is the part of a KAU which corresponds to a local unit. The KAU groups all the parts of an institutional unit in its capacity as producer contributing to the performance of an activity at class level (4 digits) of the NACE rev. 1 and corresponds to one or more operational subdivisions of the institutional unit. The institutional unit's information system must be capable of indicating or calculating for each local KAU at least the value of production, intermediate consumption, compensation of employees, the operating surplus and employment and gross fixed capital formation. The local unit is an institutional unit producing goods and services or a part thereof situated in a geographically identified place. A local KAU may correspond to an institutional unit as producer or a part thereof; on the other hand, it can never belong to two different institutional units.*

2.107 . *If an institutional unit producing goods and services contains a principal activity and also one or several secondary activities, it should be subdivided into the same number of KAUs, and the secondary activities should be classified under different headings from the principal activity. On the other hand, the ancillary activities are not separated from the principal or secondary activities. But KAUs falling within a particular heading of the classification system can produce products outside the homogeneous group on account of secondary activities connected with them which cannot be separately identified from available accounting documents. Thus a KAU may carry out one or more secondary activities.*

example preservation of cultural heritage or support to basic research or R&D activities of institutional units, or professional activities serving corporations.

When libraries are university libraries or special libraries serving internal staff of financing units, they can be considered ancillary activities of the output they serve: education, research, health, general government, information and communication, professional, scientific and technical activities, etc

Statistically speaking, they are easier to manage especially for those institutional units that have not to keep separate records, but, in this way, the library services output is not defined. Therefore, it is neither possible to identify service costs nor to compare them with output measured in non-monetary terms, nor to analyse service exchanges within virtual libraries. As a consequence, libraries should always be considered as local kind-of-activity units (local KAU) in the appropriate classes (92.51 NACE; ISIC: 92.31).

Libraries belonging to the same institutional unit situated in a specific territory such as a municipality, can be included in one single local KAU even though it is easier to collect data if the local KAU is formed by libraries and external service points belonging to the same administration as provided by ISO 2789.

The libraries belonging to the same institutional unit, wherever located, constitute a KAU. Often the costs of a KAU are not constituted of the total amount of the costs of each single KAU since there are costs directly paid for by the central administration of the institutional unit: staff, locations, networking, electricity, campus subscriptions to electronic resources, computing, central administration, etc. Therefore library services output costs are more easily recorded at KAU level rather than at local KAU level where they can be defined only after an allocation of central costs. This criterion of costs gathering is much more similar to satellite accounting rather than to central system³³, but it is more useful to build output indicators which can also serve management of library systems.

It is however to be noted that even so revised the costs would not include what libraries receive for free from other libraries or documental services, with the exception of printed documents³⁴.

In fact, there is no registration for electronic documents made freely available to patrons or for services received by other libraries or documentation or information services (from meta-OPACs to search engines) even when coming from different institutional units or economies. This fact would be irrelevant if what is obtained for free balanced what offered for free at least on an aggregated level. Obviously this is hardly the case especially for search engines. We had better to follow what has been suggested by H.H. Postner during a IARIW conference to estimate the costs of television services financed by advertisements.

As indicated by satellite accounting, the record of costs paid for the libraries belonging to the same KAU returns its value as it is surveyed by factory bookkeeping of administrations, which can be

³³ SNA 1993: [SATELLITE ANALYSIS AND ACCOUNTS](#) par. 21.13.

³⁴ According to SNA and ESA rules, books, journals and other analogical documents, whose single value is below the minimum value accepted for investments, are included into the investments, increasing a collection whose whole value is well above the established minimum. In fact, it is a common library practice the registration of the real price of these documents among library acquisitions even when they are obtained for free: for legal deposit, exchange or donation. When the book has no price printed on cover, the appraised price calculated on the current market medium price per page is registered. Therefore, according to accounting rules, it should be registered an investment of the materials obtained for free and a transfer of the same amount to the supplying library.

employed in library management and in particular in finance management. The exigencies of national accounting and management control would therefore converge.

The existence of free online bibliographical and documental services certainly constitutes an advantage for all those who have limited resources to access knowledge but it may bring those who have resources to limit the investments in this sector without realizing the opportunity to exploit their own position as holders of a dominant culture both in the humanities, social sciences, and scientific and technical fields.

Linkage between physical and monetary measures in ISO 2789 and library statistical projects

Besides library sector classification, ISO 2789 provides not only to record possible financial incomes but also to gather numerous physical data on library inputs and outputs, resources and facilities, users and uses of services .

This makes it possible on one hand to identify uses as provided by SNA 93, on the other hand to measure quantities and to estimate output according to fixed prices without being obliged to conjecture the invariance of output of an industry that has been deeply transformed by automation and telematics³⁵. Data gathering as provided by standards and their integration to monitor technology evolution and to carry out management and performance control has become the objective of several national European and international projects. References to these projects can be found on IFLA statistical web pages together with a vast and updated professional bibliography³⁶. Data gathering can take advantage of a diffused library automation that allows statistics extractions on library activities and users from information library systems, log-files of OPACs and digital libraries web portals.

Library output usages in SNA

Besides establishing its value according to SNA rules and gathering its physical data thanks to ISO 2789, library output can be differently classified according to SNA 93. In addition to the above mentioned functional purposes classification, SNA 93 lists other classes according to output types and uses.

Goods (mainly intangible) and services output can be divided into three SNA categories on the basis of data gathered by library statistical projects:

1. Market output that is production for sale, usually quite marginal but for relevant publishing activities carried out as secondary activity (for example OECD digital library charges access to a relevant part of its output);

³⁵ The first phase was characterized by automation with Dobis-Libis systems, cataloguing sharing and union catalogues such as that of OCLC accessible to member libraries. The second phase started with World Wide Web accessed directly by users. In August 1993, CIB (the Inter-library Centre of the University of Bologna) launched its OPAC on the web, the Library of Congress opened its own in 1994. From that time on bibliographic and catalogue searches on the web have been spreading. Open digital libraries followed soon afterwards and in 1999 the Open Archives Initiative was first launched to disseminate and easily discover scientific pre-prints, later it was extended to include other types of documents and information.

³⁶ <http://www.ifla.org/VII/s22/index.htm>

2. Output for one's own final use: it includes only the productions that are part of library accumulation;
3. Other non-market output for goods (i.e. catalogue records or electronic documents) and services supplied to third parties with no or just nominal fees³⁷. This category does not include the counter-value of goods and services of the libraries of an institutional unit used within the same unit (for example: for education and research activities). These activities are considered ancillary and not a library output.

So, for example, the costs of a university library should have to be split into output costs and ancillary activities, which would be the general cost of the university as a whole separately attributed to education, research and other activities. Probably we would find out that library costs for ancillary activities are prevalent³⁸. A very complex accounting indeed!

The split between production for third users and the tripartition of output can hardly be based on costs that are largely combined among the three typologies of output. It should be rather founded on

³⁷ ESA 1995 Manual 3.43: *Local KAUs as other non-market producers can supply as secondary output market outputs and output for own final use. The output for own final use consists of own-account capital formation. The occurrence of market output should in principle be determined by applying the 50% criterion to individual products: market output is output that is sold at least 50% of its production costs. This might be the case for instance when government hospitals charge economically significant prices for some of their services. Other examples are sales of reproductions by government museums and sales of weather forecasts by meteorological institutes.*

3.44. *In statistical practice, it may be difficult to make a clear distinction between the different products of local KAUs of government institutions and NPISHs. Even more, this is true for the production costs in relation to the different products. In that case, a simple solution is to treat all revenues of other non-market producers from their secondary activity(activities) as the revenues for one type of market output. This applies for example to a museum's revenues from the sale of posters and cards.*

3.45. *Other non-market producers may also have revenues from the sale of their other non-market output at not economically significant prices, e.g. the museum's revenues from tickets for entrance. These revenues pertain to other non-market output. However, if both types of revenues (revenues from tickets and those from the sale of posters and cards) are difficult to distinguish, they can all be treated as either revenues for market output or revenues from other non-market output. The choice between these two alternative registrations should depend on the assumed relative importance of both types of revenues (from tickets versus those from the sale of posters and cards).*

³⁸ See ESA 1995:

3.12 Definition:

The output of an ancillary activity is not intended for use outside the enterprise. An ancillary activity is a supporting activity undertaken within an enterprise in order to create the conditions within which the principal or secondary activities of local KAUs can be carried out. Ancillary activities typically produce outputs that are commonly found as inputs into almost any kind of productive activity, small as well as large.

Ancillary activities may be, e.g. purchasing, sales, marketing, accounting, data processing, transportation, storage, maintenance, cleaning and security services. Enterprises may have a choice between engaging in ancillary activities or purchasing such services on the market from specialist service producers.

Own-account capital formation is not considered to be an ancillary activity.

3.13. *Ancillary activities are treated as integral parts of the principal or secondary activities with which they are associated. As a result:*

- a) *the output of an ancillary activity is not explicitly recognised and recorded separately. It follows that the use of this output is also not recorded;*
- b) *all the inputs consumed by an ancillary activity – materials, labour, consumption of fixed capital, etc. are treated as inputs into the principal or secondary activity which it supports.*

usage statistics which are quite correct for services required directly to librarians. On the contrary statistics on use of online services are less reliable. In fact IP v4 protocol - still the dominant one – does not allow an exhaustive numeration of computers therefore many of them are represented by aggregators that hide real users. Things would be better with the rapid and wide adoption of well tested IP v6. Another difficulty in surveying exchanges within virtual libraries is represented by the difference between the possibility to monitor out-coming and incoming internet flows. While the first come from a relatively small number of servers located within the institutional owner or definite hosting centres, the latter arrive only partially from inside the campus. In fact they could come from outside the campus in a more and more dynamic way thanks to mobile computing. It should be useful to adopt software solutions that facilitate user identification according to their categories³⁹. Some universities employ such solutions to track usages to individuals in order to distribute the subscriptions costs among the different courses and departments. Using these software solutions extensively, it should be possible to estimate how much of non-market output towards third parties is the result of exchanges with other institutions, serving thus one's institution's final consumption.

SNA uses of library output

Library outputs as resources for the economy have different uses:

- Actual individual consumption are mainly financed by public administrations or social institutions (in particular public libraries);
- Actual collective consumption when they support basic research from outside the research institutes or conservation of cultural heritage of a country and/or of the world (in particular conservation libraries) or serve the production activities of goods and services of other institutional units without direct expenditures;
- Intermediate consumption when their products are supplied for an effective or a nominal fee to other local KAUs of the same institutional unit situated in a different location or to other institutional units of the same economy;
- Gross fixed capital formation (more often, acquisitions of intangible fixed assets) when they produce catalogue records, bibliographies, digital documents or specific software; when there are relevant activities of conservation, preservation and restoration of documents both analogical and digital which must be stored or conserved well beyond the financial year. These have to be added to the value of non-financial assets ;
- Exports and import of intangible goods and services, as a rule as barter transactions and intra-company flows because they rarely are charged with significant prices. ILL and DD must be considered exchange of services facilitating readers' "consumption" on demand.

As all national accountants know, there are the some difficulties for ancillary activities that serve local KAU of the same institutional unit situated in other economic territories.

³⁹For example, it can be used a proxy server to service the requests of its clients by forwarding them to the servers of the publishers that require rights access control. In this case the proxy server accepts the requests of authorized users who have to logon to access to the service. Therefore the organization can track usage to individuals.

In any case, the principal activity of libraries output according to SNA rules might represent just a little part of total library efforts and costs and this does not allow to discuss of output and related outcomes so I will include ancillary library activities in the outcomes.

Real output of library non-market services

The OECD Secretariat states that “*Virtually all countries use the "input method" for estimating output and value added of non-market services at constant prices. The OECD Secretariat is exploring the preferred "output approach" with several Member countries*”⁴⁰. As we have seen, there are numerous surveys on library output in physical terms. It is not easy to describe library output in economic terms that are not costs, since library supplies serve primarily to transform documental goods and services into public goods and services for final users and, thanks to the Internet, without particular limits as to the number of users served and independently from their location.

They become free goods where costs are always those of Internet connection both in terms of technical equipment and connection time costs (librarians point out that it is a problem of information literacy too). In this field things are greatly changed. 25 or 30 years ago, the costs to carry out a bibliographic search were very high and strictly dependent on professional capacity of documentalists, as databases were paid proportionally also on the basis of connection time. Early in the ‘80s the same bibliographic search cost from 10 to 100 dollars depending on how long the search session lasted. Therefore, bibliographic searches were carried out by expert documentalists who, together with users, identified keywords and the best search strategy. Web technologies have completely changed users productivity and the costs of information access so much that web connections and uses have become accessible even to those enterprises which could not have afforded them in the past. In conclusion, estimating value added of usages at constant prices is extremely difficult and it needs an analysis of the outcomes of the economy as a whole and, in particular, of the knowledge economy, Fraumeni, B.M., Reinsdorf, M.B., Robinson, B.B., Williams M.P. (2008).

Changes in management, performances, quality and marketing

The competition of alternative bibliographic and documental sources and diffused restrictive public expenses policies has obliged libraries to a more careful resource management, using performance Van House N.A., Weil B.T. & McClure C.R (1990) and quality) indicators Poll, R. & te Boekhorst P., (1996 and even looking for external funding by resorting to marketing Mullins J. L., editor , (2007). Although performances and user’ satisfaction (quality) are essential factors to improve outcomes, they are outcomes which can be measured against users and not against producers and products. To measure the utility of an output is to evaluate the corresponding outcomes.

⁴⁰ The measurement of price and volume changes of government output: the case of the Netherlands, Netherlands.

[STD/SNA\(98\)12](#)

The estimation of general government services at constant prices: Methodology and application proposal for Italy, Italy.

[STD/SNA\(98\)13](#)

Measuring output for non-market services, OECD. [STD/SNA\(98\)14](#)

Production of community and social services at constant prices: the case of Thailand, Thailand. [STD/SNA\(98\)16](#)

Measuring output of non-market services, New Zealand. [STD/SNA\(98\)27](#)

Valid and proven outcomes are powerful marketing tools. To mention McClure C.R. and Lopata C., (1996) the performance measure can be said to be the best use of resources according to their optimal quantity and proportion. This indicator fulfils also the funding institution's budgeting needs. Quality influences users' demand of output: what is demanded? Who demands it? Why? The demand focuses on certain programs or services. To value outcomes, it is necessary to measure the impact that uses have on direct users and on the context in which they act.

The outcomes of libraries and their institutions

To value outcomes, our point of view should change and turn from output units and their shareholders to stakeholders, measuring the effects of the suppliers' (libraries' and their institutions') products and activities on them. The Institute of Museum and Library Services defines outcomes as "benefits or changes for individuals or populations during or after participating in program activities, including new knowledge, increased skills, changed attitudes or values, modified behavior, improved condition, or altered status"⁴¹. These effects can hardly be attributed just to one single library, nor they can be often attributed to all the libraries of an institution⁴² even if this is a university. These effects can be better attributed to the whole system of services of an institution or of a library and documentation centers network. As a consequence their measures can be better defined at institutional unit level and finally collected in industry or economies⁴³.

The definition and consequently the measure of outcomes should take into consideration the purposes of the institutions, of the community of users and the context. Therefore, three cases will be considered:

1. university libraries,
2. public libraries,
3. corporation libraries.

This paper will focus on the first case which has already been treated in a number of studies, projects and tests. Public libraries will be mentioned briefly on account of their social impact. As regards the third case, it will be mentioned a project that will be presented at an IFLA 2009 satellite meeting in Italy. A number of countries have already joined the project which is interesting for its relationship with input-output reference table and the valuation of effects on output.

University libraries outcomes

Universities, both public and private, are more and more subjected to the evaluation of accreditation agencies whose tasks are identifying institutions with exemplary outcomes assessment programs, exploring what other academic and learning assessment professional associations are doing, investigating national surveys currently being conducted on campuses, and compiling university rankings. As noticed before: "Outcomes are used as feedback to identify necessary changes in library instruction in the ongoing effort to improve instruction methods and student learning results

⁴¹ Institute of Museum and Library Services, *Perspectives on Outcome Based Evaluation for Libraries and Museums*, 2001 p. 20, <http://www.ims.gov/pubs/pdf/pubobe.pdf>.

⁴² In some countries universities have one central library and a number of branch libraries. In this case, the central library gathers statistical data for the whole institution quite easily. In other countries, each faculty or department has a library and a university can sometimes count on more than 100 autonomous libraries. In this case a central office is needed to coordinate and develop common projects. In any way, it is the whole library campus network that should be taken into account to value the effects of libraries activities on university outcomes.

⁴³ Urban, regional, national, ...

as a result of student receipt of library instruction” Robert E. Dugan and Peter Herson, (2002). Clearly instruction is not the only objective. In fact there can be direct library outcomes and indirect outcomes that depend mainly on the context in which the library acts.

As Dugan and Herson maintain: “ the user in the life of the library, the user and the library in the life of the institution, and the library and institution in the life of the user.”

The first outcomes are those that library managers or library systems managers should try to achieve answering with statistical data to the following questions: “*What are the results of a program or process?*”, “*How successful or effective is the library?*”, “*How effective do customers perceive our programs to be?*”, “*What beneficial effects are we having on our customers?*”, “*How could a program to be changed to better suit the needs of our customers?*” The second outcomes are those of research and instruction institutions that libraries help to achieve participating to commonly shared vision, mission and goals. To contribute to the achievement of these objectives each structure in its environment has been assigned objectives, goals, cues and budget resources. Given the contribute of many subjects and the relevance of the environment, measures can be **direct** if they refer to the expected outcomes (i. e. the capacity of professional self-training by reading books and journal articles), **surrogate** if they refer to a phenomenon that is considered significantly influenced by the achieved outcome (for example the case of the graduates from a certain university finding a position more quickly or obtaining better wages at their first job experience thanks to the acquired competences and skills), **composite** when the indicator is a synthesis of many elementary ones such as longevity according to sex, size of the city of residency, instruction level, participation to cultural events, library use or use of documental web sites.

This relevance of the context and of the public served primarily by an institution has made ARL (Association of Research Libraries) identify 4 groups of outcomes for member libraries and their institutions: “*Within the ARL New Measures agenda there are at least four implied definitions of outcomes in terms of how various working groups and projects are approaching the issue: (1) learning outcomes, (2) research outcomes, (3) institutional outcomes, and (4) personal control or electronic service quality issues.*” (Kyrillidou M., 2002).

As can be noted, the last group focuses on digital libraries and online informative services outcomes. However a particular attention to new technologies is to be found in each group.

Learning outcomes

As Kyrillidou maintains and all universities managers can confirm: “Learning outcomes is a larger area of investigation where educational research and assessment faculty have been engaged in trying to identify how students can achieve their learning objectives more readily”. *Bonnie Gratch Lindauer*⁴⁴ describes the *student learning outcomes and enabling outputs* as follows:

:

1. *All graduates are information literate, prepared to be lifelong learners able to effectively identify, access, and se a variety of information resources; proficient with appropriate information technologies; and able to evaluate and apply information to meet academic, personal, and job-related needs.*
2. *All graduates possess the skills, abilities, attitudes, and knowledge specified in their academic programs. **Enabling Instructional Outputs and Good Practice Criteria:***

⁴⁴ Lindauer, B.G., pp. 19-21.

- a. *Undergraduate, specifically the general education program, and graduate programs require students to become information literate.*
 - b. *Sufficient and appropriate library, network, and other information and learning resources, equipment, and services are provided and/or made accessible regardless of format or learner's physical location, and integrated into educational programs by required usage in courses across the curriculum.*
 - c. *A computing environment supporting direct-user access for all academic staff and students, regardless of location or time, is effectively operating and reflects service linkages among complementary units providing library, computing, and network services.*
 - d. *Improve distance education and on-campus independent and course-related learning have been acquired and/or created locally by collaborations between library and other academic units.*
 - e. *The academic environment is conducive to learning and promotes an awareness and appreciation of multicultural diversity.*
 - f. *Effective instructional practices are employed, such as peer group interaction, problem-solving assignments, appropriate use of instructional technology, and other active learning methods that increase the extent and quality of student involvement in learning.*
 - g. *Instructional objectives and student outcomes are clearly specified in academic programs and services so that what students are expected to know and do is evident.*
 - h. *Assessment plans, procedures, and processes are in place to evaluate and improve the quality and effectiveness of learning and teaching.*
3. *Graduates pursuing postbaccalaureate study possess the knowledge and skills to succeed in graduate/professional programs.*
 4. *All graduates have the knowledge and skills to conduct an effective job search.*

For each point Lindauer lists selected performance indicators that allow to survey satisfaction degree. Indicators can be both quantitative and qualitative, but never expressed in financial terms even when some of them refer to an appraisal of job positions and possibly to the effect on income. I think one more point could be added to the list. It is a point that certainly influences the development of one's own human capital and so one's own professional life, that is the capacity to select and take advantage of the most relevant literature on a specific subject, both analogic and digital presented in books, reports, journal articles and to access information contained in documental, statistical or factual databases in order to learn about different geographic, historical and cultural contexts and compare evolution trends. Even in this case, it is clear the importance of learning how to use a worldwide digital library as pointed out in ARL4.

Difficulties in measuring outputs in economic terms are even increased by the fact that many education outcomes are non-market and so they are valuable only in figurative terms. A deep and interesting study approaching measurement in economic terms is that of Michael Grossman (2006)., "Education and Nonmarket Outcomes" in *Handbook of the economics of education*, edited by Eric A. Hanushek and Finis Welch, n.26 of series: Handbooks in Economics, editors Kenneth J. Harrow and Michael D. Intriligator, NH and Elsevier. In the two volumes handbook there are other studies that can help define education outcomes in economic terms and the quota to attribute to libraries and documental services.

Robert E. Dugan and Peter Herson⁴⁵ contribute to define outcomes assessment and accounting, disaggregating the student learning outcomes that interest us from the other student outcomes “that measure aggregated statistics on an institution-wide basis ...[they] are concerned with attributes and abilities, both cognitive and affective, which reflect how the student experiences at the institution supported their development as individuals.”

Research outcomes

Dugan and Herson note that: “research outcomes are appropriate for graduate students, especially doctoral students, and for the faculty”. However library support to research also includes research and development activities carried out by graduates and, in particular, ex alumni. The question about what contribution libraries give to these outcomes has been summarized by Martha Kyrillidou (2002): “Do libraries matter in the life of the everyday men and women, in the lives of the readers who explore new ideas and thoughts, and in the lives of the scholars who are engaged in the systematic investigation of furthering knowledge?” There seems to be three relevant questions to university libraries that are both physical and digital. They offer to researchers necessary bibliographic information to select the most interesting publications and the materials they want through three objectives:

- ” This ultimate goal of bringing together a perfectly customized collection of books for the purposes of fulfilling users’ needs was driving collection size constantly upwards in the 20th century. It is really libraries’ commitment to quality that was driving quantity...⁴⁶,” Kyrillidou, M. (2002);
- To assure access right to digital collections⁴⁷,
- The establishment of a well working interlibrary cooperation network to guarantee good ILL and DD services.

The second favourite library outcome is that of increasing research productivity thanks to a better use of time dedicated to research and a better ergonomomy of work conditions (research can be carried out any time of the day and anywhere thanks to computing and networking). The third one is to increase research impact thanks to its dissemination on the web via IRs, which could be more economical, rapid and widespread if carried out with tools that make potential users’ search, discovery and selection easier⁴⁸.

Institutional outcomes

We have already considered outcomes from the point of view of students and researchers. Other campuswide goals are those of universities to obtain better assessments. Accreditation agencies,

⁴⁵ Robert E. Dugan and Peter Herson, Outcomes Assessment: Not Synonymous with Inputs and Outputs, *The Journal of Academic Librarianship*, Volume 28, 2002, Number 6, pages 376–380

⁴⁶ *Librarians are concerned about throwing away information content and want to safeguard the container, traditionally known as the book. Librarians are concerned that they may be throwing away the missing piece in a puzzle that as far as we know may never be set up.* Kyrillidou (2002)

⁴⁷ The reinvention of the Library of Alexandria in its digital manifestation is still inspiring to digital library developers who see technology facilitating the goal of universal access to our cultural heritage. Kahle, B., Prelinger, R.& Jackson, M.E. (2001).

⁴⁸ In addition to the studies and the projects promoted and sustained by ARL, such as E-Metrics for digital libraries services, see the studies by Carolynne Presser,(2001), and Wonsik “Jeff” Shim, Charles R. McClure, Bruce T. Fraser, John Carol Bertot, Arif Dagli, & Emily H. Leahy (2001),

higher education institutions, and professional organizations obviously include learning and research outcomes in these evaluations when they can be assigned to a specific university with certainty. There are however other valued institutional activities. And libraries contribute to some of them quite significantly. As B.G. Lindauer writes: “Academic libraries, one of the key players in providing and structuring instructional resources and services, also are expected to document how their performance contributes to institutional goals and outcomes. Using accreditation and ACRL sectional standards criteria. Institutional effectiveness examines the extent to which institutions meet their stated mission, goals, and objectives. Naturally, the planning and evaluation process focuses on the effectiveness of student learning and the extent to which learning and the institution’s contributions to society center on the research process.”

One institutional goal is to obtain more funds from sponsors and more commissions for research projects. The incomes provided by these funds could represent a monetary measure of institutional outcomes. Institutional outcomes funding that can be influenced by library contributions includes sums paid by ex alumni to use library services for professional updating and research commissions paid by corporations that take advantage of university library services and appreciate university research activities.

Personal control or electronic service quality issues

As far as bibliographic information and documents were physically conserved within the library, users discovered and selected what they needed looking into printed catalogues or reference works both maintained and owned by the library. When users needed help, they could turn to the library reference service.

Before the advent of the web, one single library or information service could not possibly cover and provide their users with all exiting literature and information in an exhaustive way. This is why documentalists and information brokerage agencies began to develop.

With the advent of the web and search engines, available information has so increased that reference, documentalist and brokerage services have been no longer able to meet the users needs especially because they would have cost too much⁴⁹. It is therefore essential that users learn how to search for, select and access information (information literacy) by themselves. Yet, when acquired these skills, users are however neither able to read the huge number of references that normally can be retrieved, nor even browse them for a first selection. Ranking criteria and selection techniques are necessary. Search engines have worked hard on automatic ranking systems even though they alter them to favour sponsors.

Selection techniques require skills that users do not always possess at the beginning. It is therefore recommendable that competence centers such as universities offer tools or services for selection regarding not only their own collections but also information available on the web. Libraries should improve bibliographic services passing to users the expertise they have developed without burdening instruction and research activities. This qualitative improvement could be only achieved with the interdisciplinary contribute of different experts in particular: computer scientists, logicians and science philosophers, besides of course librarians.

Outcomes could be measured against an increase of users productivity and an increased economy of learning, R&D activities and documental supply chain. It will be no easy task to identify the

⁴⁹ When first cars appeared, those who bought one at extremely high costs had to employ a driver with mechanical skills. Nowadays the private transports would be blocked if each family owning a car should also employ a driver. It would be senseless if we had to calculate the value of a third paid for each car driver by the owner or a member of his family. In fact there is not a significantly different employment of the time dedicated to travelling. The same happens when someone has to ask for reference or documentalist services to third parties.

necessary measures and it will be even more difficult to turn outcomes into monetary values to aggregate them. In this respect M. Kyrillidou⁵⁰ writes: “The relation between the quality of electronic library services and outcomes is yet another challenging issue where more research is needed.”

Community outcomes

It would take too long time to deepen public library outcomes. For the brevity sake we will just mention the article by Joan C. Durrance and Karen E. Fisher (2003). The authors focuses on the effects that public libraries have on geographical communities helping them preserve and diffuse their own local culture on one hand, and on the other hand bringing them to integrate and overcome the digital divide when economically disadvantaged.

Knowledge economy outcomes

The assessment of library and documental systems outcomes for the Knowledge economy is one of the cutting edge issue of what we intend to study and present at IFLA 2009 conference. Indeed, if the relative weight of libraries on PIL is extremely low, the influence of education, research and culture is certainly greater. Even greater it is the importance of the knowledge industries⁵¹ that are a determinant part of the *Knowledge economy* on the agenda of politicians and statistical institutes⁵². To develop his assessment project about the effects of libraries on the Knowledge economy, professor Robert. M. Hayes suggests that partner countries use four models:

1. The Library Planning Model to define the need for new library competences,
2. The National Input-Output Matrix to determine effects on the whole economy,
3. The National Industry-Function Matrix, to determine needs for qualified staff in each industry,
4. The Cobb-Douglas Production Model to determine effects of increased human capital on output .

The study carried out by prof. Hayes and his Austrian and Croatian fellow researchers could determine the development of tools for a monetary valuation of direct and indirect outcomes of library activities. Yet, it seems necessary to go further and add a more social, macro and global vision, using other model offered by national accounting such as SAM and Satellite Accounts.

Back to Luca Pacioli

The multitude of proposals to measure the different outcomes and the difficulties to assign them comparable economic values, in short to express them in monetary terms make me think that it may be useful to go back to Luca Pacioli⁵³ and his double-entry accounts: outputs are the resources and

⁵⁰ M. Kyrillidou also writes: “. Another reason why it is increasingly inadequate to describe libraries only in terms of the extensiveness of resources is that control of such resources is increasingly residing outside library channels. Assessment efforts for developing measures for the networked environment and digital libraries need to take into consideration the collaborative environment that needs to be in place among authors and creators of information content, distributors and publishers, as well as libraries.”

⁵¹ Christian Schlögl and Robert M. Hayes (2007) identifying Knowledge industries write “This segment includes those industries in which the substantive content of the information is significant. It includes education, research and development, the professions (law, medicine, engineering, architecture, etc.), and what traditionally are called “Miscellaneous Business Services” (e.g., consulting, related services). Also libraries are an integral part of this segment.

⁵² See Eurostat (2005).

⁵³ I am writing this paper in my retreat near the sources of Arno about 43 km as the crow flies from Borgo Sansepolcro, the town of Luca Pacioli (1445-1517?). I wonder if his spirit has inspired me while, still sleepy, I was thinking about

outcomes are the uses.⁵⁴ The values of outputs must balance the values of outcomes as they are registered as debits and credits.

As it is typical of many Internet information providers to have marginal costs approaching zero, an increase of usages would be substantially without any value and it should not be included in the account. In practice there are knowledge outcomes only if users are individuals, corporations or institutions, that commit themselves to use them and possibly at their best.

To do that, they employ technical resources, staff, time to develop human capital according to their institutional units needs, taking into account the economic prospects as producers and consumers. Considering these resources, marginal costs are no longer null and the aggregated output of acquisition, conservation, dissemination of knowledge⁵⁵ can be assumed as measure of the outcomes as it appears to be the aggregation of all the stakeholders efforts to let the economy benefits from them.

It is however reasonable to think that the unitary values of knowledge incorporated into other outcomes and into the human capital of each individual are bound to reduce after a first increase caused by the worldwide diffusion of development and the spreading of new competences to stay on the global market.⁵⁶ As a consequence there could be a reduction of the relative aggregated value too. This reduction will be the measure of the real contribute to development and it will free resources for other activities without causing a reduction of one's own knowledge patrimony which on the contrary will grow.⁵⁷

Brief conclusions

The measures of library inputs and outputs must be expressed both in monetary and physical terms. Significant statistics have been already gathered and are being developed also outside SNA reference framework. To include them in SNA system better, it could be first of all useful to update some classifications particularly that of Activities (ISIC) and Industries, introducing "Information

my paper at dawn. Luca Pacioli, Franciscan friar and inventor of double-entry accounting, was a distinguished mathematician and a Geometry scholar. He lived at Borgo Sansepolcro at the time of Piero della Francesca, studied Mathematics in Venice where he came familiar with the way merchants kept their accounts. In Milan he taught Mathematics where he worked with Leonardo da Vinci. Fra' Pacioli wrote "*Mai si deve mettere in dare che quella ancora non si ponga in avere, e così mai si deve mettere cosa in avere che quella ancora quella medesima con suo ammontare non si metta in dare. E di qua nasci poi al bilancio che del libro si fa: nel suo saldo tanto convien che sia il dare quanto l'averè*". [never register as a debit something that is not registered as a credit yet and so never register as a credit something whose amount is not already registered as a debit. In this way the book keeps the balance: in its settlement credit must balance debit]

<http://acct.tamu.edu/smith/ethics/pacioli.htm>; <http://www-history.mcs.st-andrews.ac.uk/References/Pacioli.html>

⁵⁴ Resources must include efforts made to make knowledge useful. Uses implies the benefits users obtain from usage.

⁵⁵ These are the activities with which libraries contribute to knowledge industry significantly.

⁵⁶ Globalization has increased the value of the competences of those who are more able to stay on the global market, emphasizing differences and incomes concentration. Knowledge dissemination should make this phenomenon temporary.

⁵⁷ A significant example comes from agriculture. As Engel observed in the 19th century, agriculture output had so increased as to increase offer to satisfy an increasing demand by a more numerous population with a higher income, by reducing the added value quota. It is the importance to lose (relative) importance, otherwise development would have come to a stop. Obviously a rapid income increase in traditionally poor and hungry countries together with the introduction of new non-alimentary uses of agricultural products can temporarily produce higher prices that could be reduced by the worldwide diffusion of modern productive technologies. See Enzo Di Cocco, *Agricoltura e società Edagricole*. Bologna, 1976, VIII, 96. Full-Text :<http://diglib.cib.unibo.it/diglib.php?inv=16>

and documentation”. Also the definition of ancillary activities and consequently that of intermediate consumption and production should be modified. Probably it will be necessary to determine whether knowledge is an industry or rather an outcome. Then, it should be ascertained whether we can include outcomes in the purposes classifications or we need to create an International Outcomes Classification besides CPC and ISIC. Finally it seems necessary to introduce a knowledge SAM and a satellite account of the knowledge industry as there are many institutional sectors that contribute to bibliographic and documental production and diffusion and use them as public goods and services.

The importance of information available online is increasing. It is therefore necessary to use statistical data obtained from automated systems – in particular web ones – much better. The SAM should also permit to register situation and evolution of knowledge users’ revenues. The satellite account should also permit to include paid acquisition activities and users’ non-paid time into knowledge output. Indeed the economic valuation of knowledge is complete only when it becomes a shared patrimony that generates outcomes. Outcomes cover both market and non-market entities and in particular development and circulation of knowledge, human capital and consequently competitiveness and productivity increase. Library and correlated activities outcomes measures are still partially and unevenly gathered. They therefore need further study. Valuations are sometimes based on either qualitative indicators build on individuals’ judgement or quantitative ones, seldom monetary ones. Some economic models can help give them a monetary valuation facilitating aggregation and comparison. To meet accountability principles, the monetary value assigned to outcomes both for productions and individual uses should necessarily coincide with that of the extended output^{58,59}.

⁵⁸ The author is the coordinator of Italian Project “A federal directory of libraries and correlated organizations” . The project has been inspired by ISO 2146 - Directories of libraries, information and documentation centres and has the following goals:

1. a register of Italian libraries and correlated organizations (units),
2. cooperative library grids (relationships between units),
3. links to target users (faculties, departments, schools, companies, households, etc.)
4. online information on collections, facilities and services offered to users,
5. statistics possibly obtained from information library systems and DB of linked institutions.

The project intends to collect data on inputs, outputs, users, and uses.

The project has already started and the project group is testing workflows using data from the sector of libraries of an institution of higher education. So the outcomes of interest are mainly those of education and research. An English version of working documents will be soon available online:

<http://www.cib.unibo.it/acnp/attivita-di-sviluppo/biblio-dev>.

⁵⁹My thanks to Anna Maria Tammaro, member of IFLA governing board, for asking me to study the possibility of an Italian partnership into the library statistical project promoted by UCLA and coordinated by prof. Hayes and for giving me the opportunity to present my study at the satellite meeting of IFLA 2009 in Florence next year. Precious also her bibliographical suggestions. My thanks also to Marialaura Vignocchi, head librarian of the digital library of the University of Bologna. Without her contribution this paper could not have appeared in this form. I am the only responsible for possible inaccuracies and omissions.

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