How to use statistics to survive.

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Statistical indicators: a battle field

When the library of the Department of Statistics at the University of Bologna (DS) obtained the ISO 9001 quality certification seven year ago, I thought that it would have reached a *safe zone* where it wouldn't run the risk to become out of staff or money.

But I was wrong. One of the three full time staff member left in few days giving us a short time to share her tasks and operations, although more than 60% of them were described in written procedures and instructions.

To make things worse, the Head of the Centralized Library System (CLS) emailed me that "according to the centralized statistics the library's staff was not as deprived compared to other libraries" which meant that it was not sure that we might have a substitute.

The aim of this paper is to demonstrate via a combination of statistical data (from the library quality system, from the Italian Official Statistics and other public sources) that the conclusion drawn were *at least* objectionable. That the CLS glance over the DS library was *at least* out of focus. That the information they possessed were *at least* limited and only partially correspondent to what the DS library was actually doing.

When it comes to *living or dying,* how to use statistics may become a battle field, and in case of "defeat" the pitfalls might be quite serious: to reduce the library opening hours or, in our case, to abandon the Quality System management itself.

Evidences. The CLS statistics related to 2008 ranked the DS library quite low: in the Social Science sub-unit (15 libraries) DS outputs were 90% below the average. At the same time, the library was internationally known for its quality system management, and its staff took part to relevant international events (i.e. WLIC 2006 Seoul, paper presented).

The advocacy strategy illustrated in this paper, is based on a range of statistics to corroborate a wider meaning for "efficacy "and "efficiency", based not only on circulation of books and document delivery: easy phenomena to describe, since they can be automatically counted, but that don't represent other important services or libraries activities.

The user's point of view, satisfaction statements, observations and explored behavior – as known via the library quality system in 7 years of historical series – will be used, in parallel to the dimension of time in delivery services.

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More specifically, we will try to demonstrate that by means of the ISO 9001 quality system, the DS library has been stimulated to measure different aspects of the library services, that could be of some interest if applied also at the Centralized library system level. The reason behind the selection of such indicators is related to the main goal of the quality certification, that is to raise users' satisfaction.

Will we be able to give a live picture of the library so as to witness its vitality, enthusiasm and support from the users?

The Centralized Library System's Statistics: an 'out of focus picture' of the library
The Central library system (CLS) indicators (year 2008) referred to the DS library are:

Efficacy
Document circulation per student: 9,23 items (total circulation/ total of students registered in the library per year). Document circulation per Teaching staff 111,50 items (where "circulation" is the total of loans, DD, and ILL). Student (but not PhD's that are not considered in these statistics) and Teaching Staff should be considered representative of the potential user.

Efficiency
1. Document circulation per FTE   422,59 items
2. New inventory entries per FTE librarians   187,50 items
3. Total acquisition value per FTE librarians   25.743,29 €

The CLS efficiency measures are meant as indicators of the library's staff ability "to perform more tangible operations." The reason for the FTE (1) is that loans are often done by part-time students or volunteers instructed by librarians.

These indexes vary a lot among libraries. In a broad sense, the CLS explains the variability as due to different factors: a) a low   document circulation may be influenced by organizational flows b) by the different educational fields covered by each library and their peculiarities; c) by the acquisition policy adopted; d) it may depend from the information needs of the library's users.

One might object that these factors are not weighted or correlated : is the d) factor more relevant than c)? How can it be factually proved that a library's organization is inadequate (factor a)? Moreover, an expected value is not stated for each indicator, so as to define a reasonable result to be attended.

Indicators 2 and 3 are calculated on the librarians full time equivalent, being both the acquisition and inventory procedures usually performed by them. The efficiency indicator nr.3. seems very odd: it is explained – admittedly with some approximation -   as the "expenditure capability" for each staff unit. So, the bigger the library's budget the higher the ranking! In short, it doesn't seem a valid measure of "efficiency".

It seems to me that the picture of the library is not correctly focused on through the CLS indicators' set. Something seems to be missing; for instance, there are no indicators measuring the library's efforts to satisfy users' expectations.

Also other important elements of context are not considered, that could counterbalance the CLS statistical data as they should. For example, since the scientific research field of Statistics is dramatically smaller than Economics, it may be clearly expected that the department and the Faculty of Statistics have few students and a restricted teaching staff; moreover, being half the DS collection built on statistical sources (for which the loan is not permitted) the number of loans is implicitly limited.

The Quality management System: a focused picture of the library
When it is looked at from the quality management system's point of view, the library's image changes dramatically. The 22 indicators data set of the ISO 9001 quality system controls the back-office operations of the library staff from the point of view of the process time speed: in 2008, it took the librarians an average time of 2,3 days to process books acquisition from the arrival of a new volume to its availability in the Opac (target value 8 days) and 1,3 day to process a document delivery transaction (target value 2 days). 133% is the percentage of DD outgoing over the incoming (requested) (target value 120%).

Regarding "circulation" we have some ideas about users' opinion as they are investigated by means of an annual survey that explores three dimensions: frequency of use, importance and satisfaction (fig. 1)

Service	Use	Importance	Satisfaction
Loan	3,4	4,6	3,6
DD and ILL	2,5	4,5	3,8

Fig. 1 Scale 1-5 (source: customer satisfaction survey at DS library, 2008)

Being the satisfaction's score higher than the usage one, it may be inferred that there is no direct correspondence between *how many* DD and ILL are requested, and the user's satisfaction; so we may assume that different factors have positively influenced the user's opinion, somewhat in connection with *how* the services were delivered or the quality of the library's holdings (fig.2).

Satisfaction	Students	PhD
Books in collection are useful	4,00	
Books in collection are coherent with your research field		4,2

Fig. 2 Scale 1-5 (source: customer satisfaction survey at DS library, 2008)

The importance values - the highest – are seemingly disconnected from the use. As if to say, that our library users consider such services as loan, DD and ILL services of fundamental importance, and that they expect the library should provide them.

The statistical sources– which are definitely *the core* of the library collection – are not specifically considered in the CLS statistics because loan is not allowed -   vice versa they are evaluated through the DS library's survey:

Quality indicators	Use	Importance	satisfaction
Italian Statistical sources	1,8	3,9	3,6

Fig.3 Scale 1-5 (source: customer satisfaction survey at DS library, 2008)

Again, satisfaction and importance seem to be uninfluenced by low usage. Other factors may be considered as an explanation of such a low use: the higher value of the collection is based on historical statistics, and the fact that the Italian official statistics are largely available on line. So the 1,8 use score may *speak* for few users that have successfully browsed the shelves for a specific research scope.

The library National statistics in 2007: general outlook

According to the Official Italian Statistical Institute, ISTAT and ICCU (Central Institute for the Catalogo Unico), the city of Bologna has 323 libraries, with a significant 3,4 libraries per 10.000 inhabitants, better than the regional median of 2,4 and 2,3 for the whole Northern Italy (2,1 national scale).

Among these figures, the Centralized University System counted more than 80 libraries; in other words, university libraries are responsible for 1/4 of the potential users in the city. On a national scale the proportion changes: among the 12.405 Italian libraries, the university ones are 2.204, worth 15,6%.
Bologna hosts the oldest university of Europe and relies on the well established reputation of a nice living city especially for students. If it is true that the University community plays a crucial role in the city *vitalization* - socially, economically and culturally – we might say that the university libraries are part of this phenomena acting different roles: as an information, meeting and studying place, to mention a few.

If University libraries represent a restricted sector, the specialized statistical ones are an even smaller cluster. The peculiarity of a collection of statistical data has been studied in 2001 by the Italian Library Association (AIB) who organized a national survey over 6.000 public libraries (thus excluding University) that held in their collection official statistical sources. The final report showed that 49,3 % of their holdings were local statistical data; in Emilia Romagna, 301 libraries offers statistical reference documents.

The composition of the statistical collection of Italian public libraries is characterized by the predominance of yearbooks (56,2%, 33,7 % in Emilia) and monthly bulletins (79,8%, 8,8% in Emilia) published by local or national Organizations.

In conclusion, the competitors of the library of the Department of Statistics in a regional scale

are 301. Our strength point is represented by the conspicuous historical series of the Italian statistical sources collection of the library; moreover, the DS reference librarians have improved theirs competencies over the years and have regularly received a specific training. The library offers the academic community a one to one service of statistical reference both on electronic and traditional sources. The service is promoted with leaflets and via the library website.

The "survival" strategy of the library at the Department of Statistics

The first steps were to understand the academic, regional and national context in which the DS library operates, to define our competitors, the potential users and the strengths and weaknesses of our organization.

Summing up. The library of DSS has 301 competitors in Emilia Romagna. It can count on a 15.000 statistical sources collection. Our strengths are: the historical characteristics of the collection, skilled library staff highly experienced in statistical reference, positive feedbacks from the registered users of the library about the statistical collection, good value of speediness in delivering services such as book loan, DD and ILL.

Weak points are: the statistical collection items cannot be borrowed, a small acquisition budget and a small potential students-users target, since the scientific discipline of Statistics is largely considered "for few".

Our point of attack is that the CLS statistics are not fully capable to represent a focused and detailed picture of the library's activity, because they do not provide sufficient tools to intercept less evident but not less important signals.

What is it, in my opinion, that CLS statistics seem to be unable to measure? For instance, the highly personalized services that the library has developed in response to its users' requirements: laptop loans, space for group-studying in the library, statistical reference on demand and on appointment, alert service on new books and periodicals based on the interests profile of each research member of the Department, disclaim treatment, chart for the library's service renewed yearly.

The DS priority over the years – or at least ever since the ISO quality management system was established – has been to intercept the users' requirements via a range of feedback instruments – focus groups, questionnaires, user's observations – and to use them as inputs for decision making. In 1920, the Russian Constructivism movement 's *motto* stated "not the old or the new but the necessary": we also believe that what is really *necessary* is the point of balance between the user's and the institution's needs. And this means *efficacy*.

As the ISO requirements demand, a certified library is well managed when the customer 's expectations and needs become inputs of the product/service realization, and when the outputs of the customer's satisfaction influence the library's system management (fig.4).
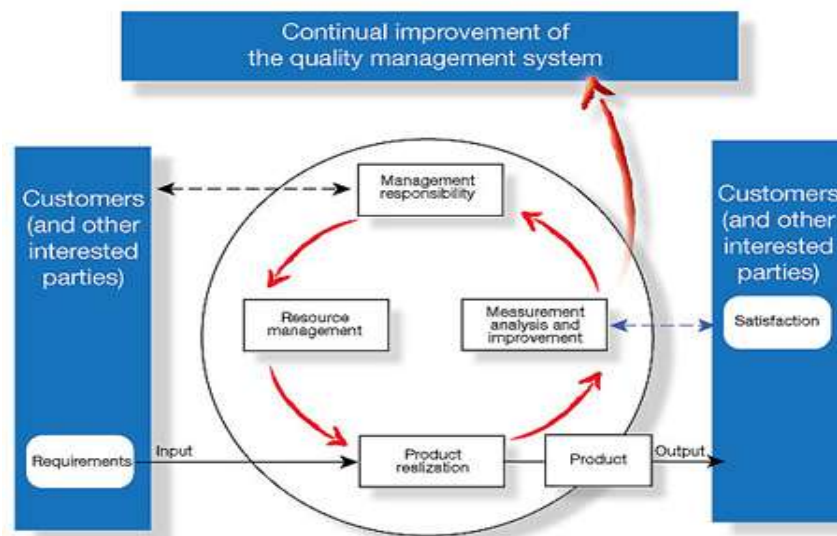
Fig. 4 The ISO 9001 quality management system

In the past seven years, the DS library has put a lot of energy to measure those inputs and outputs. So that the main issue of our "survival" strategy is: the DS library is strongly committed to catch its users and stakeholders expectations, because theirs feedbacks are of vital importance for the continual improvement of the library's management.

The focus group is indeed a powerful technique to intercept the library users expectations. At the open table of this informal discussion, the DS library has received many feedbacks such as: " I am very happy to have in our Department a library of such *high standards of usability* but that still shows a desire to improve. This attitude is not very common – I don't want to be polemic – among other libraries I have visited where, maybe because of the lack of staff or other reasons I don't know, they cannot offer the same *quality of service* : they seem to perceive the customer as bothersome … what the hell does he want from me?" (source: the DSS library FG 2003).

The "high standards of usability" and the "desire to improve" and a positive attitude towards the customers are strictly related to the ISO philosophy of the quality management system (again fig. 4).

The DS efforts to intercept users' expectations were also focused on the analysis of the user characteristics: we have tried to create a profile for our typical user, applying statistical methodologies such as Principal Component Analysis and Cluster Analysis. The combination of these techniques gave us a live portrait of the typical user of the DS library, full of nuances and also apparent contradictions, as real human beings should be; such user, that we have decided to call "the crammer", represents the 41,9% of the overall sample (source: DS 2006 survey).

These users - mainly students of Statistics - live outside the Campus and go to the library three times a month. They think that the book collection doesn't fully meet their

requirements. They are less satisfied than the overall sample of the library's web site, of the neatness in the lecture rooms, and of the helpfulness and professional competence of the library's staff.

On the other hand, they are most satisfied – much more than the overall sample - of teachers' notes availability, reading room comfort, PC availability , electronic and traditional journals availability. They rate electronic journals and internet access as the most important services.

The "crammer" behaviour may possibly explain the low circulation score at DS library (9,23 items per student), which shouldn't be considered necessarily a weak point. First of all, he is not so assiduous (three times a month) and shows more interest in journals and in the availability of teachers' notes at the library desk. The book collection is presumably more important for the Teaching Staff (the circulation is 111,50 items) and for those specialists who may visit the library only to browse or consult Statistical sources (not for loan).

This regular interaction with the DS users is an important chapter of our Chart for library services. Although the Chart is part of the compulsory requirements of the Centralized library system's regulations, very few libraries have adopted it so far. The DS library organized in 2008 a focus group for testing the draft version of the first edition of Chart for the CLS's services.

The measurement of Library services at Ferrara University
The Library System at the University of Ferrara has seemingly adopted the ISO 9001 methodology and, as the DS library, is an active member of BIC, the Italian network of ISO 9001 certified libraries. BIC's mission is basically to share good practices and exchange auditing activities.

At the University of Ferrara the ISO 9001 quality management certification obtained in the year 2009 covers the entire Library System, thus including all centralized libraries and also the offices that guarantee some core centralized processes, i.e. documents acquisition and cataloguing, ILL and DD services, information technology management. In 2010 the University has promoted and obtained an integrated quality management system certification in which the library services are covered together with other services operated by several administrative offices, such as the students benefits office, the under/post graduate students administration office, the international mobility office etc.). The decision to pursue an integrated quality management system at the university level was based on the idea that all services addressed to the same final users, i.e. students, should be promoted and dealt with in a common frame, so as to guarantee the same standard of quality and care.

Prior to the ISO 9001 certification a lot of time was spent by the Library system in the effort to build a set of indicators that could meet the requirements of three different schemes, all of which were of great importance for the library system management:
   a) the ISO 9001 requirements
   b) the university overall KPI (Key Performance Indicators) scheme, aiming at defining a set of indicators that could measure and supervise all the main processes in terms of efficiency and efficacy of offices/libraries as well as of the staff

c) the national context, keeping in mind the set of indicators adopted by G.I.M. [2](Gruppo Interuniversitario Monitoraggio sistemi bibliotecari di ateneo) in two national surveys (2003 and 2007), which are also adopted by Bologna University libraries system.

The result was a set of 31 indicators, designed to measure the efficacy of selected processes, the efficiency of staff and, last but not least, the overall level of users' satisfaction (students as well as teaching and research staff). A wide set of indicators covering all the main front-office and back-offices activities on one hand, and the results of these activities (users' feedback) on the other hand, was in our opinion the instrument that could integrate the different requirements that the library system was asked to meet:
a) to obtain the quality management system certification according to ISO 9001 international standard
b) to monitor the library system performance according to the University of Ferrara guidelines
c) to compare, where possible, our results with those of other university libraries in Italy.

Such a wide set of indicators would also let us find out more easily possible correlations between indicators themselves, thus helping our interpretation of results.
A further effort was put in fixing values to be aimed at as expected results for each indicator (i.e. quality goals); whenever the indicator was also a GIM indicator, the expected value was chosen taking the mean value of the most recent Italian survey available.

We may try to compare the performance of the two organizations over the GIM indicator nr. 11: Total Circulation (loans + ILL + DD requested) / Institutional potential customers (student + teaching staff) :

2008	UNIFE	Expected value	UNIBO	Expected value
Total circulation	61.077		425.907	
Students + Teaching staff	20.374 (includes PhD Students)		89.210	
Indicator's result	3	Not less than 3	4,7	Undefined

Fig. 5 Unife and Unibo libraries benchmark.

Considering the national GIM benchmark (survey 2006: value 2,63) both universities are doing better than the national result.
Unife settled for its libraries a more challenging expected value, which for the year 2008 was fully achieved. In fact, to indentify measurable and tangible objectives allows the library to clearly define its actions for improvement. The indicator's result for Bologna is highly influenced by its potential users' dimension – considerably much higher than Ferrara's; on the

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[2] GIM is a formally established group which gathers representatives of several Italian university library systems; it aims at improving common instruments of measurement and evaluation of library services in Italian universities and has carried out two national surveys so far. (see http://gim.cab.unipd.it/)

other hand, Bologna university owns a much bigger collection of books and journals. In any case, in the absence of an expected value, Unibo performance fails to show its significant results.

When efficacy matters (happy end)
The DS library can verify its efficacy by different means. Comparing its outputs with the ones of other libraries that have similarly adopted the ISO 9001 standard or the GIM indicators; continuing to focus on its users' satisfaction (by the way, the overall satisfaction in 2009 was 5,2 and the quality perceived 4,9 – scale 1-7). And indeed, the DS library can learn from the University of Ferrara's approach to the service measurement, by introducing in its data set some GIM indicators or key performance indicators of the Centralized library system level.

What may also happen is that the General Library System at the University of Bologna could finally get progressively nearer to the ISO customer-oriented approach. A present opportunity is the new release of the Chart for library services of the CLS in Bologna. For the first time, the CLS will tentatively introduce some performance indicators that will measure the time speed in library processes, calculated at the single library level: time speed of loan in closed shelves libraries; time speed of Document Delivery and ILL, to mention a few.

We believe that when efficacy matters, these indicators could better represent the library's effort to save the time of the reader. And I shouldn't forget the happy end: a new librarian joined our staff. A very good and talented one.

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