Toledo–Lucas County Public Library: Economic Value and Return on Investment

"The human mind is not capable of grasping the Universe. We are like a little child entering a huge library. The walls are covered to the ceilings with books in many different tongues. The child knows that someone must have written these books. It does not know who or how. It does not understand the languages in which they are written. But the child notes a definite plan in the arrangement of the books – a mysterious order which it does not comprehend, but only dimly suspects."

—— Albert Einstein

Executive Summary

A typical economic impact study of a for-profit business or venture is a well-established routine in which the communal benefit from the economic impact and job-creation intertwines with its profitability. Toledo-Lucas County Public Library is not a typical for-profit business, but a non-profit entity with the mission to contribute to the prosperity of the local community of NWO. The Library fulfills its mission by filling the information gap for businesses, adults, and children facing information technology-intensive challenges. The Library delivers economic value to the local community by providing and facilitating access to a wealth of knowledge and information stored in government, non-profit, and private data sources in various forms. In doing so, the Library provides many benefits to the community in a cost-efficient way. To quantify the taxpayer's return from investment in TLCPL, the critical task is to assess the economic value of services provided. Given the importance of this task, this study provides two estimates of this value each obtained using different economic methodologies.

Quantified Value

About 442 thousand people reside in Lucas County, OH in 2010, and the TLCPL register over 320 thousand cardholders -- indicating that TLCPL directly affected every three out of four county residents.

The branches and bookmobiles of TLCPL circulated over 7.1 million items in 2011, including about 2 million circulated individually by children or for children by their teachers.

The TLCPL number of references in 2011 is nearly 1.5 million (including instances when a single search access more than one database).

The Library sponsored the pursuit of community-oriented externally-funded start-ups resulted in more than 3 thousand searches in the non-profit Foundation directory in 2011, 174 individualized one-on-one consultations with non-profit grant specialist, and about 1 thousand accesses to Grant Select and other high-value specialized databases.

In 2010, Lucas County residents earned over $15 bln of personal income, and about $14 mln, or less than 0.1 percent of personal income, was used to fund Library activities from Lucas county property tax. The annual cost of TLCPL services per resident of Lucas county is about $32 per year -- which includes free access to all Library materials, computers, and specialists. In contrast, per capita income in Lucas County, OH in 2009 is $34,208.

Web presence of the TLCPL is characterized by the total of more than 800 thousand web page requests in 2011, including 135 thousand image views of a unique photograph collection of historic Toledo -- Images in Time.

Library patrons conducted more than 900 thousand logons on Library computers with an average time spent at the computes to be about 40 minutes per session.

TLCPL spent about $33.5 mln to provide public services in 2011 and increased its net assets by another $1.8 mln.

The convenience of free wireless connectivity in TLCPL buildings attracts patrons and promotes the image of a safe and comfortable environment for all age groups. TLCPL wireless network carries more than 100 thousand connections in 2011.

The economic value of public services provided by TLCPL in 2011 is placed in the range of **$118 mln -- $136 mln** per year.

The Return On Investment for TLCPL is 2.86, i.e., for one dollar productively spent in the Library, the community receives net benefits worth of $2.86.

Contents

Measuring the Economic Value of Public Libraries

The value of information and access to data sources

In fulfilling its mission, TLCPL serves as important North West Ohio gateway to government, non-profit, and private sector information published in print, closed-network and open-network databases. Its main strength arises from skilled staff that serve as intermediaries between county residents and sources of information. The value-added of Library activities arises from human interface, user-oriented guidance, and personalized consulting service
The total -- the sum of direct and indirect -- value of public services provided by TLCPL in 2011 is $118.3 mln. In contrast, it costs $33.5 mln to provide these public services.

The economic value of Library activities is attributed to the following factors:

-- *economic efficiency from sharing*, which lowers costs of acquiring and accessing information to individuals and businesses because of maintaining and sharing vital information resources; for example, Library subscription fee to a private database is a fraction of what all individual users would have pay in individual/business subscription fees

-- *elimination of barriers for individuals and business to accessing important information resources for which they initially lack necessary skills* by providing needed expertise to guide Library patrons in conducting searches, filling applications, and intermediating their use of Library resources; in doing so, the Library fulfills its education mission and effectuates access to information resources to county residents whose information needs would be unanswered, including but not limited to children and families, people with disabilities, small businesses, information technology-dependent projects and new ventures, etc.

-- *accrued and distributed among county residents -- in the form of public services -- the dividend* from accumulated assets including unique local area historic collection

The economic efficiency from sharing Library resources and economic dividend from capitalized net assets the Library arises from allowing county

residents access to shared resources, or equivalently, $1 spent by the TLCPL yields $3.35 of quantifiable benefits.

The business and technology department of TLCPL handled more than 17.5 thousand business- or technology-related requests for information by individuals for personal use; about 2.1 thousand requests related to vital functions of local businesses. Given that the average size of an establishment in Lucas County is 18.8 employees in 2010 (which is smaller than the size of a business because some firms consists of many establishments), a business-information request on average affects well-being of 19 employees. Consequently, the direct and indirect effects of business-related requests are more valuable than those made for personal use.

The Library patrons performed nearly 1.5 mln searches (including remote access requests) through an extensive collection of proprietary databases, subscription fees to which are paid for by TLCPL.

Quality of Life and Economic Development

Quantifying value of library services to local community does not take into account human capital and quality of life aspects of the library patron's future or potential benefits.

The use of the information in the public library materials and developing the skills for using public library resources provides intrinsic value to library patrons:

- school graduates, students, and other job seekers find information about careers or resume preparation
- entrepreneurs-to-be learn about steps and procedures needed to start the business, apply for licenses, get access to databases with information on markets and potential suppliers
- consumers and homeowners find information on consumer products and do-it-yourself project resources
- community-oriented entrepreneurs obtain information about for-profit and non-profit ventures, access to non-profit externally (no-TLCPL funded) grant opportunities databases, and receive assistance in pursuing non-profit grant applications
- investors and global economy-minded entrepreneurs access some of the most sophisticated proprietary investment services as well as access to institutionalized knowledge on foreign cultures, businesses, and economy

- socially distressed (job seekers, terminally ill, technologically illiterate, etc) have an opportunity to constructively socialize with other individuals with similar problems and improve their outcomes by positively enforcing each-others' successes

TLCPL public services enhance human capital of its users by

- increasing their ability to find and/or apply for a suitable job
- increasing their chances to find a job that fits their individual skills and career ambitions
- giving local area residents a better perspective on education and continued education opportunities available and accessible in the local area
- increasing the chances of successful new for profit or non-profit venture in the local area

TLCPL public services improve quality of life by

- reducing the burden of illiteracy or medical condition-restricted accessibility to public and private database information
- improving the level of literacy, especially consumer- and business-related information technology literacy
- enhancement of the level of children's civic preparedness and cultural awareness in society
- development of an informed and more mature citizenry to advance the society

Lucas County Economic and Demographic Background

Total Population in 2010:	441,541
Total employment, non-agricultural private sector (mid March, 2009):	189,906
Median Household Income (est. 2010):	$39,200
Average Earnings per Job (2010):	$47,445
Gross Domestic Product (Toledo Metropolitan Area) in 2009:	$26.6 bln
Per capita income in 2009:	$34,208
Percentage of population below poverty level in 2010:	19.80%
Percentage of under age 18 in poverty in 2010:	29%

Number of establishments with full-time employment (mid March 2009): 10,115

The list of all industries with indication of their presence in Lucas County (the number of establishments, the estimated employment, and their location quotient) is provided in the Appendix.

Areas of specialization of the local economy (industries/industrial clusters with high levels of location quotients):

- automotive manufacturing, manufacturing components for automotive industry, and related services
- freight transportation, including multimodal transportation, warehouses and logistics

Economic impact of TLCPL public services

• The total cost of public services:	$33.5 mln
• Net increase in capital assets of TLCPL:	$1.8 mln
• **The total cost of TLCPL activities:**	**$35.3 mln**

The regional economic multiplier for Lucas County, OH in 2009: 3.35

The economic profile of the Lucas County, Oh is provided in the appendix with the list all industries operating in the County. The profile contains the number of private sector establishments in the industry, employment, and Location Quotient. The set of location quotients indicates the industrial mix in the region and is used to quantify the extent of industrial specialization. For example, the industry NAICS 336112 “Light Truck and Utility Vehicle Manufacturing” has location quotient, which indicates this industry’s presence in Lucas County exceeds the national average by 1895 percent, and, therefore, Lucas County’s economy is highly specialized in the production of Light Trucks and Utility Vehicles.

The private sector employment levels are obtained from official County Business Patterns database, prepared by the U.S. Census Bureau. However, to avoid disclosure of privileged information supplied by private enterprises, the Census Bureau deploys the system of data suppression flags where the true numerical value is replaced with a range. To make economic analysis feasible, the industrial employment levels in such cases were estimated. These estimates are on average unbiased, i.e., the sum of all industries in each sector are reconciled. The concept and details of the methodology can be found in (Gerking et al 2001).

Lucas county industrial employment data and corresponding location quotients are used to compute the size of economic base in the county, and hence, the regional multiplier. The multiplier for 2009 equals 3.35. This enables one to obtain the total value of direct and indirect effects in Lucas County.

Total economic impact (economic value to taxpayers) of TLCPL public services in 2011 is

Economic value = $35.3 mln x 3.35 = $118.3 mln,

where the total cost of public services in 2011 is $33.5 mln, and the regional (Lucas County, OH) multiplier is 3.35 of total value of direct and indirect effects of public services of TLCPL.

Cost versus value and the role of information

When a person buys a lottery ticket and pays $2 for it, the cost base of the ticket is $2. The value of ticket is uncertain without additional information. The key information in this case is the winning numbers. Suppose the ticket wins a jackpot that yields its owner $20 mln of taxable income. Now the ***value*** of the ticket is equal to the dollar amount that is equivalent to the holder of a winning ticket. In this case, this amount is equal to $20 mln of taxable income, although the ***cost*** base of ticket is still $2. However, if the ticket's wining is zero, then the ***value*** of the ticket is zero. Hence, for the information-sensitive goods, the value of an item might vary dramatically from its cost basis to the acquirer of the item at the moment when the key information pertaining to the item is generally unknown.

The key distinction between valuable tickets and useless tickets is that valuable tickets are circulated (presented for payment), while useless tickets are either rejected or thrown away.

The cost basis of books in the Library is a historic and accounting fact. The value of books in the Library is determined by those who use these books to obtain needed information. Books that are never requested have zero value to Library users. Books that are valuable to library patrons are requested. If the library stores useless (never requested or referenced) books, the value of the book collection is zero.

Valuation of Specific Services

The valuation of circulation of TLCPL materials

The summary of circulation of items by value is presented in the following table.

The summary of circulated items by value

Value Category	Number of items	Total value, thousands of dollars	Average value of an item
Less than $25.00	671,816	10,122.5	$15.10
$25.01 -- $100.00	159,532	4,614.6	$28.93
$100.01 -- $200.00	316	43.3	$137.02
Total items less than $200	831,664	14,780.4	$17.77

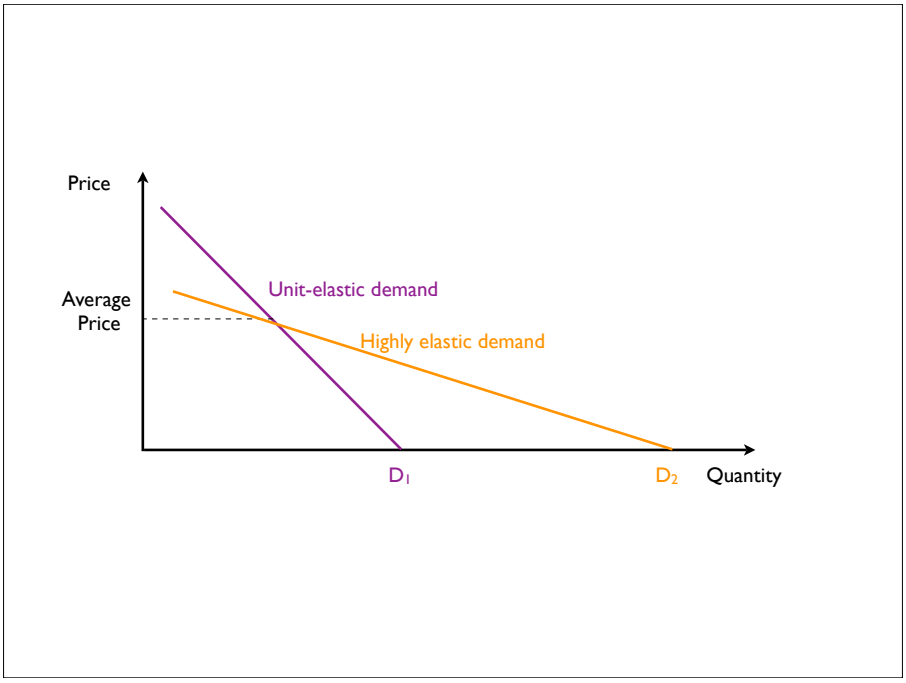
The table presents aggregate statistics for the items in circulation and no distinction is made with respect to the contents of the items with different value (adult books, juvenile books, paperback, music books, government documents, etc.). Using the data in the table as a broad characteristic of demand for circulated items, the demand elasticity is determined using the midpoint method. The method uses two points: (1) items less than $25 and (2) items in the range of $25 -- $100. The average value of an item is used in lieu of the market price. ***Thus computed the price elasticity of demand is 1.95***.

> *The price elasticity of demand is greater than 1, which indicates the demand is **elastic**.*

Elastic demand is characteristic of price-conscious consumer who is reluctant to spend money on overpriced items and more likely to pursue negotiated discounts, volume savings programs, or consider other cost-saving measures. In sum, highly-elastic demand is a prominent characteristic of thrifty behavior. In contrast, price-inelastic demand is typical for consumers when "money is no object".

The value of elasticity is important for characterizing economic efficiency of circulation-related activities. Indeed, if the Library were not a

non-profit entity, it is well known result from economic theory that a total revenue-maximizing demand is achieved at the price levels when the price elasticity of demand is equal 1. Given that the Library operates on a fixed budget, its highly elastic attitude toward its asset formation results in a lower cost to the user per item than it would have been otherwise.



In Figure above, the unit-elastic consumer is characterized with the maximal quantity demanded equal D_1, which is realized when the good or service is provided for free. At the same time, the highly elastic consumer is to enjoy quantity D_2. If both consumers operate under the same budget constraint, D_2 exceeds D_1 exactly by the factor determined by the consumer elasticities ratio. In other words, given the same budget, a more elastic consumer would be able to consume a larger quantity.

***For example**, suppose a unit-elastic Library anticipates to spend $100 each year on buying books. First year, the price of books is $1, and the Library buys exactly 100 books. Second year, the price of a book goes up to $10, the unit-elastic library buys 10 books. Then the total book collection of unit-elastic library will be 110 books and average book price is $200/110 = $1.82. Suppose the Library is highly elastic and competent enough to anticipate market fluctuations. The Library anticipates to spend on average $100 on books each year. First year, when books cost $1 each, the Library buys 180 books and thus spends $180. The second year, when the price of a book is $10, the Library buys 2 books and spends $20. After*

two years, the Library purchased 182 books for which it paid $200, so the average cost per book is $200/182=$1.10. The cost effectiveness of a more elastic library in this case is $1.82/$1.10=1.65. This means that the average cost of a book if it were purchased by a unit-elastic library would be 65 percent higher.

The actual coefficient depends on many factors including the actual cost of the book and replacement value of the book. It should be noted the the replacement value for demanded by out-of-print books is much higher then the nominal cost of the book at the time when it has been acquired.

The cost-effectiveness of the Library is attributed to the high elasticity of its purchasing practices. This can be interpreted that TLCPL acquires items that approximately cost 51 cents of what would cost approximately one dollar to an inexperienced or unskilled librarian. This suggests that the cost base of circulated items in TLCPL is approximately equal to one-half of the real-world replacement value of an equivalent collection of information. Hence, the replacement value of an average item in TLCPL collection is

***Average circulated value** = $17.77 x 1.95 = **$34.65**,*

where average direct cost of circulated item is $17.77 and the price elasticity of demand is 1.95.

During 2011, TLCPl circulated just over 7.1 mln items. Since the library patrons bear no costs of circulating either cheap or expensive items, the price of circulated item has no effect on their choice of borrowing library materials. In contrast, if library users had to pay a fee that depended on how expensive a book is, most users would use cheaper and not necessary most suitable sources of information (smaller dictionary is cheaper than a bigger dictionary, paperback is cheaper than hard cover, a more superficial or less accurate manual is cheaper than a more comprehensive one, etc.). For this reason, the value of circulated items during year 2011 is equal to

***Total circulated value** = 7.1 mln x $34.65 = **$246.0 mln**,*

where the total number of items circulated in 2011 is 7.1 mln and the average value of circulated item is $34.65.

A conservative estimate of market value of access to copyrighted work can be observed by comparing prices of hard copy (either paper back or hard cover) books to restricted use licenses of book contents available for download from commercial vendors. It should be noted that many TLCPL are

out of print, their cost basis does not reflect market value of these books. The typical replacement cost of out-of-print books is much higher than the value suggested by the price elasticity of demand measure. In addition, rare and unique items are frequently prone to "antique roadshow effect" -- the cost basis of an item might be ridiculously low in comparison to a market (auction) value. For this reason, the estimate of user's value from circulated items is taken at the rate of 33.33 percent of the total estimated value:

User's value from circulation = $246.0 mln x 0.3333 = $82.0 mln

where the total circulated value is $246 mln and the discount factor for circulated items is 33.33 percent.

The Valuation of Reference Services of TLCPL

Reference requests convey value to library patrons by conveying information embedded in electronic databases, printed matter, and collective expertise of TLCPL staff. The information retrieved from databases to library patrons has relevant repercussions for both personal and business-related choices.

There is a tendency for reference services at TLCPL to be of a higher value per occurrence to library patron than the use of circulation. Among many factors contributing to this gap, the following aspects are taken into account:

- reference-based data sources are rare or unique so that individual library users are unlikely to obtain an easy access to these (comprehensive electronic databases are not sold in book stores);
- electronic databases are expensive so that causal users of such databases lack financial resources needed to acquire individual licenses
- individual users lack familiarity or expertise about available data sources, so without professional guidance from the Library staff, many database inquiries would not be as fulfilling as those carried out with help from the TLCPL
- electronically stored information -- unlike printed matter -- can be easily organized in a systematic fashion regardless of potential use, so that electronic reference provides a more flexible access to and navigation over the available data source
- TLCPL provides access to the entire reference and the set of documents of the Library of Congress as well as other unique databases (such as patents) that are relevant for sustaining innovation and technologically-driven entrepreneurship in the local economy.

In addition, the access to electronic resources in TLCPL is not limited to single user at any given time, so that several users can concurrently access electronic databases without imposing negative externalities, or affecting detrimentally, other users. This conclusion is supported indirectly by the reference use -- ***there have been completed approximately 5 reference queries per average library patron per year***.

There are about 1.5 mln reference requests logged in TLCPl references sources; there are approximately 320 thousand library card holders in 2011,
so the average library user completed

1.5 mln / 320 thousand = 4.7 ≈ 5 queries per person per year

The tendency of the value of reference to be at least as high as value of circulation is accounted in the valuation of reference services as follows. First, the valuation for referenced items (value per query per user) is taken to be equal $34.65 -- the same value used for circulation. This value corresponds to average use value per request. The discount coefficient of 0.5 is applied to valuation to account for the fact that single user reference request might query more than one database. This allows one to arrive to a modest valuation of reference services:

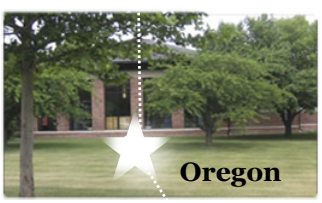
Total reference valuation = 1.5 mln x $34.65 x 0.5= $26 mln

where 1.5 mln is the total number of requested logged into TLCPL reference data sources, the average user value per reference request is $34.65, and discount factor to account for the potential redundancies that occur when more than one data source is queried.

Value-added Services Provided by the Library

There are numerous activities supported at the TLCPL that enhance the value of basic services (circulation and reference) provided by the Library. The valued-added services are treated separately from basic services because of the Library's unique position in the NWO in providing basic services given the Library's collection of materials and data source licenses. The value-added activities in the TLCPL go beyond simply librarian-intermediated access to the information gateway, and include the following

- meetings with Library patrons and broader public utilizing Library resources with the purpose to advance Library's mission;



- computer access (including ability to print) with unrestricted internet access for registered Library patrons;
- 'read a book' and other juvenile- and family-oriented activities that aim ease children' access to the Library and promote Library's mission;
- commercial-free support for wireless connectivity in all Library buildings.

The impact of value-added components is modestly estimated at 26 percent of the overall basic Library services. In comparison, when large private sector firms provide 'free' wireless access to all visitors of its establishments using Starbucks model, the wireless network connectivity is not commercial-free. The wireless connectivity service is designed to attract more customers is recognized to contribute to the firm's positive bottom line. In contrast, the wireless connectivity at TLCPL buildings is commercial free, and network users are not traced by their use of websites or topics. Evidence of wireless connectivity utilization is provided in Table 3.

Meeting space provided by the Library is multifunctional in its use. The Library follows certain policies set in place to ensure that Library-sponsored meetings do promote mission of the Library. These activities include individual meetings with potential entrepreneurs, patent applicants, external grant-seekers, etc. -- all organized or sponsored by the Business, Technology, and Science Department; the value-enhancing aspect of these activities is substantial given that in 2010 there have been conducted 479 meetings with total number of more than 920 hours, including 25 staff hours. Altogether, TLCPl supports 3,736 programs with unknown duration. The empirical evidence to support the use of meeting space is provided in Table 4.

The value-added factor of Library activities is diverse (affects all branches of the Library and and all groups of users) so that the individual benefit from the Library might vary from the average values dramatically. The diversity (the distribution of users by branches, the distribution of users by thematic collections, and the distribution across adult-juvenile metric) of computer usage in the Library is evidenced in Table 5.

Providing vital services to county residents, the TLCPL manages to strike good balance between personal and business patronage. The statistics collected by the Department of Business, Technology, and Science, suggest that the Department processes about 20 thousand information requests on annual basis. Many of these requests are motivated by individual's personal interest and rarely have any business-related repercussions. However about 10 percent of the total number of requests are driven by a business-motivated need or a potential new business, non-profit venture, or a project involving

community. The percentage of business uses reported by the Library staff is a rather modest assessment of potential business use of the Library's expertise in Business, Technology, and Sciences. First, Library patrons might not be willing to disclose the purposes of their requests. Second, some patrons of the Library might be uncertain about the potential of their information request until after their request has been processed.

The distinction between personal-interest and business-motivated information requests are relevant for assessing the economic value of Library value-added services: personal-interest request typically concerns with one individual and very rarely extends beyond the immediate family. In contrast, business-motivated requests -- whether they aim to expand market area, locate potential suppliers or customers, or find a solution to technical issue -- directly affect more than one individual. Specifically, a successfully completed vital-information request in a business world is relevant for existing or expanding business of a competitive firm. From economic theory, the benefit of such a service to the firm is not limited by the potential to improve the bottom line of that firm but to preserve existing jobs at the firm. Consequently, even if it is only one person who requests business-related information, it is the entire workforce of the firm that is affected by the outcome of the request. Since the Library's policy is not to discriminate by the size of business, and Library deals equally well with requests for information from either small businesses and large well-established employers, the average number of affected by a business-motivated request is 19 people. This result is obtained from the following:

$$\textit{the average size of establishment} = \frac{\textit{total private sector employment in Lucas County}}{\textit{total number of establishments in private sector}}$$

i.e.,

the average size of establishment =
189,906 employees / 10,115 establishments =18.8.

From perspective of Business, Technology, and Science information requests, about 18 thousand annual requests by individuals affected about 18 thousand residents; and about ***2 thousand business-motivated information requests affected about***

2 thousand requests x 18.8 employees = ***37.6 thousand employees****.*

By these measures, the value-added services at the TLCPL are estimated to yield the value-added margin of at least as average in the economy. A typical business practice considers the profit margin to be

'normal' or 'healthy' when it exceeds 20 percent of the firm's cost. However, any market data are prone to business cycle fluctuations, susceptible to market volatility and potential market manipulations, which might provide results that would be biased either way from the fundamental tendency. The solution involves the use of the long-term estimates of the productivity of the economy and its long-run profit margin. It is estimated to be at the level of 26 percent (Smirnov, 2012). Therefore, if the Library were operating at the long-run equilibrium level, the effect of value-added activities would have improved the Library's value of services produced by 26 percent.

By applying the 26 percent long-term profit margin, the total value of value-added services at the Library is

***total of value-added services = ($82.0 mln + $26.0mln) * 0.26=$28.1 mln*,**

where $82.0 mln is the value of circulation services, $26.0 mln is the value of reference services, and 0.26 = 26 percent is the 'normal' profit margin for value-added services.

Return on Investment

The taxpayer's return on investment -- the value of services provided by the Library to County residents consists of the following aggregates:

circulation = $82.0 million
reference = $26.0 mln
value-added services = $28.1 mln
Total = $136.1 mln

In comparison, the economic impact analysis of TLCPL's public services places a similar price tag on Library services, which is **$118.3 mln**. The discrepancy between the two methodologies arises from different accounting of the Library real effects on the economy. In the economic impact method, the services are assumed to be internalized by county residents directly as the services are provided. In the non-market valuation method, the economic impact involves direct and indirect effects that arise from economic activities that would have not existed without the Library. One of the reasons for the gap between the results of the two methodologies directly relates to a well-known "brain drain" problem of Ohio -- when most college graduates move outside of the state because of the lack of suitable employment and entrepreneurship opportunities in the local area. In this case, the taxpayers -- the state residents -- are the direct beneficiary of the service, but the positive

externality from the service is being enjoyed in other locations. Similarly, if County residents use Library to apply for a job, and the job happened to be in another locality, the resulting benefits will be accounted for by the first method but disregarded by the second one because the economic activity will occur outside of the Lucas County.

In addition, TLCPL provides public service to a greater community (via freely accessible web site, interlibrary loans, acting as a custodian of rare or unique Toledo and Lucas County historic materials. The value of these services is in providing access to information about local area to the rest of the world, free from advertising, prejudice, or bias.

By applying the conventional formulas for computing the Return on Investment (ROI) coefficient, the resulting number for TLCPL is

ROI = ($136.1 mln - $35.3mln) / $35.3 mln = 2.86 = 286%.

The value of ROI coefficient indicates that for every $1 invested in (spent on) TLCPL, the community receives $2.86 of net benefit. The comparable benefit-cost ratio for TLCPL is 3.86.

The result of this study fits well in the literature on public libraries. For example, return on investment for Indiana Public Libraries is 2.38; for Carnegie Library (Pittsburgh, PA) is 3.0; for Cleveland Pubic Library (2009) is 2.7; for Montgomery County (incl. Dayton public library) is 3.69*; Southwestern OH is 3.80*. Numbers with asterisk (*) indicate benefit-cost ratio which generally exaggerates ROI.

http://www.daytonmetrolibrary.org/docs/MontgomeryCountyROIRevised.pdf

http://www.clevnet.org/pdf/CLEVNET_ROI_Report_May09.pdf

http://www.lrs.org/documents/closer_look/roi.pdf

For meta-analysis of ROI studies in the U.S. and other countries, see Aabo (2009).

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