

Improving Economic Development Performance Through Economic Life Cycle Accounting

Thomas N. Yoder, PhD
Decision Commerce Group, LLC

July 23, 2018

Economic life cycle accounting plays a vital role in good government, starting with multi-criteria planning to support sustainable development to transparency and assurance in the reporting of economic impacts of investments and tax incentives. Perhaps most importantly, economic life cycle accounting supports local economic performance management processes for economic development, planning, and finance professionals. A new breed of economic accounting systems creates not only the pro forma budgets that represent the starting point for performance management - similar to the impact statements produced by regional impact models - but also detailed statements that inform an action plan and the measurement and reporting process. Implementing these systems is as easy as using online apps that produce accounting workbooks or, for organizations looking to reduce the use of spreadsheets, economic accounting systems can be integrated with financial and planning systems.

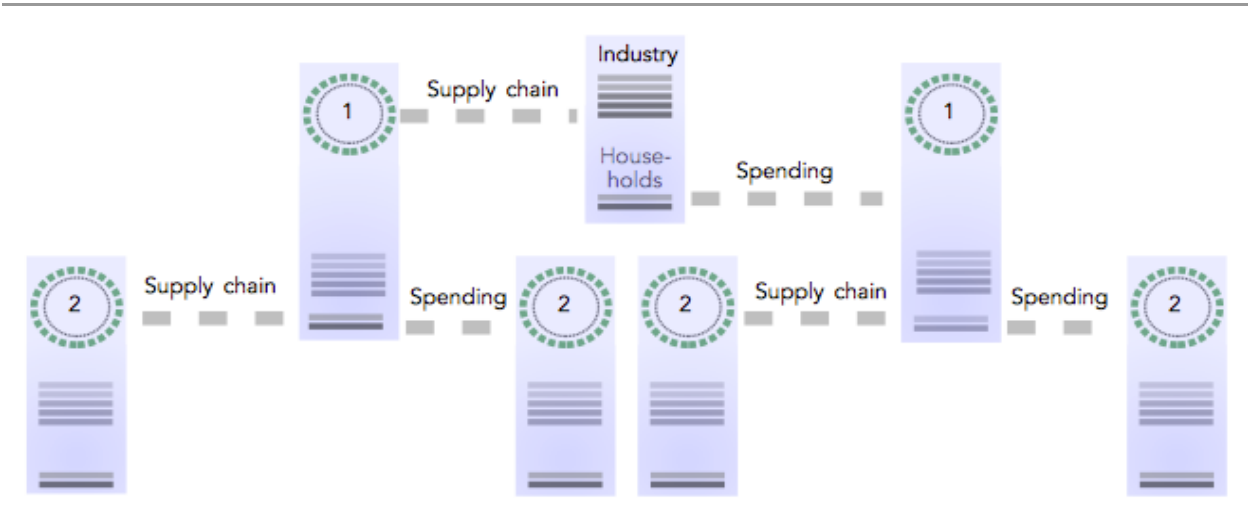
What is economic life cycle accounting?

For any economic activity, life cycle accounting is the tracing of production back through the supply chain and forward through the spending of income using double entry bookkeeping, where the double entries are demand and supply instead of debits and credits. Compared to financial accounting, which concerns itself with either demand or supply side entries for an economic activity, economic bookkeeping is the simultaneous accounting of demand and supply, producing a balanced system of production and income transactions within a national, regional, or local economy.

Figure 1 illustrates the concept of economic life cycle accounting through the first two cycles. Just like environmental life cycle assessment, economic life cycle accounting systems produce a complete accounting of the impact of an economic activity from the initial material inputs and intermediate goods to the final demand for the product. Through the production life cycle back through the supply chain and forward through the spending of income, the initial economic activity multiplies more or less depending upon

how much of the resulting economic activity takes place in the geographic area of interest. By keeping track of these connections, economic life cycle accounting tallies up the total value added within an economic system that results from a single economic activity.

Figure 1: Economic life cycle accounting illustration



Understanding and managing these system impacts that occur during the life cycle - compared to just the initial impact - is critical to improving economic development performance. In the next section, I discuss the performance management process and the new breed of economic impact accounting systems that support this process. I finish the article with an example of how to use these new accounting tools to manage and report on performance.

Improving performance

Many government and private organizations operate according to a performance management process that starts with strategic guidance, planning and budgeting, and then measures performance as the organization implements the plan, and ends with accountability and assurance as results are audited and reported. For economic development, the performance management process begins with smart planning to guide investments, incentives, and abatements. Next, pro forma economic impact budgets are created from the plan to manage and measure actual results. Finally, these results are audited and reported, providing not only public accountability, but

performance management and improvement within the government departments responsible for economic development.

Vital to improving performance is this process of preparing and managing to economic budgets. Pro forma economic life cycle budgets represent an active performance target to guide efforts at improving the economic performance of the regional system. Guiding these efforts requires an action plan – a course of action derived from an understanding of life cycle connections to improve performance and hit the budgeted numbers. That is, economic impacts are not simply exogenous, or outside of, the control of professionals working in government and economic development agencies. Economic development professionals work daily to turn potential supply chain and labor connections into lasting relationships between local companies and between companies and employees. Improving economic performance is a managed process in which impacts and “multipliers” are an outcome of efforts guided by an action plan.

In addition to setting targets and a course of action to improve performance, performance management requires reporting and auditing of results. The issuance of GASB77 gives government finance and economic development professionals the opportunity annually to provide citizens with a balanced reporting of economic impacts and costs related to economic development incentive programs. To do so, though, requires economic life cycle accounting tools that integrate with the economic development action plan. Specifically, finance professionals need tools to inform auditing of results, with lists of key demand-supply transactions that significantly determine economic outcomes. By auditing these key connections, government finance professionals ground-truth the results, providing assurance that reported impacts are more than just pro forma estimates; the results are realized with their local economic system.

To meet these requirements for performance improvement and governance, the new breed of economic life cycle accounting tools must include the following features:

- 1) **local purchasing targets** - rather than basing economic impact targets on past levels of local and regional connections, new tools incorporate the ability to set performance targets that improve on past levels;
- 2) **round-by-round accounting** – rather than focusing on the end, such as number of jobs and the value of the “multiplier,” new tools account for the path to the end in order to provide an action plan on how to improve performance and affect the end result, and to provide necessary details on demand/supply connections to support audits and for assurance purposes. This round-by-round accounting of successive supply/demand transactions back through supply chain and forward through the spending of income

provides the necessary detail to serve as an action plan for improving local economic performance;

3) **multi-criteria impact reporting** – recognizing that economic impact criteria differ by location and the state of the local economic system, new tools go beyond standard impact metrics like “jobs” and the “multiplier” and link life cycle industry production with economic system health criteria, such as resiliency, regeneration, and occupational variety.

4) **financial and geographic planning systems implementation** – economic development is one of several processes in government planning and management. To integrate with other financial and geographic planning processes and systems, new tools require language and capabilities, such as pro forma budgets and multi-criteria decision analysis, that work in tandem with these other systems.

Economic development, planning, and finance professionals may be familiar with regional impact models that produce estimates of economic life cycle impacts, often referred to as Type 1 and Type 2 impacts and multipliers. These models are mathematical algorithms that estimate economic impacts of policies and projects typically before the fact. As such, these models are very similar to financial budgeting spreadsheets, in which pro forma financial statements are prepared based on mathematical formulas and user-defined parameter values. These regional models produce pro forma budgets of economic impacts that result from a production or expenditure activity, using parameter values for input use and local purchasing.

The specific purpose for which these regional impact models are designed – to analyze investments, incentives, and expenditures of public policies, programs, and economic development activities – supports standalone policy or economic development decisions rather than a continuous performance management process that moves through planning, measuring, reporting, and auditing stages. The purpose of the new breed of economic accounting systems is to go beyond pro forma impact reporting and become a management tool to improve performance. While still constructed around an input/output based system that specifies production requirements for an economic activity, the new breed of systems is designed to support professionals as they go from planning to implementing and reporting.

Example from 2015 Wooster Economic Development Report

The purpose of this example is to illustrate how an organization can use economic life cycle accounting tools to improve performance and do more than just report the direct impact of an investment or incentive. For this example, I am using an economic life cycle accounting system developed by Decision Commerce Group, and two projects

that I considered representative of tax abatements covered by GASB77 from the 2015 City of Wooster Economic Development Report:

- LuK USA LLC, a manufacturer of torque converters and the largest employer in Wooster, received a tax abatement for an expansion project that will add a new production line and result in new payroll of \$1,809,600;
- GOJO Industries, a manufacturer of hand hygiene and skin care products, received a tax abatement for expanding operations to a vacant site in Wooster, resulting in new payroll of \$12,040,000.

After converting payroll to production output using information on payroll per output by industry, I entered this project information in the regional impact web app published at decisioncommerce.com. This app requires three inputs - the location, industry, and production value - to generate a workbook that includes pro forma statements of impacts summarized by round, industry, workforce category, and energy fuel.

Also required is the choice of local purchasing targets: 1) an upper limit based on local capacities for each industry, or 2) an upper estimate based on simple location quotients. Empirical research suggests that simple location quotients represent a target for increasing local purchasing patterns compared to current patterns, while an upper limit based on local capacities is, in effect, a target based on "buy local first" preferences.

For this example, I chose to use the more aggressive targets based on local capacity constraints. The important consideration for choosing local purchasing targets for any project is the level of effort that you and your team will put into influencing the life cycle impacts of a project. Your management process, project-by-project and day-by-day, increases local economic activity as you turn potential local connections into lasting relationships. The more effort put into this process and the higher priority of any particular project will determine its life cycle impact, so select a more aggressive target for projects that your team will be focusing on.

The following figure shows the pro forma, or budgeted statement of impacts for these two projects. For this example, value added (gross local product) increases by \$192.5 million, with a local earnings impact of \$68.6 million. Local energy use will increase by 885 billion Btu with energy carbon emissions increasing by 124 million tons. For comparison, I created a pro forma impact statement using the upper estimate (simple location quotient) method. With this method, pro forma gross local product is \$145 million and resident income is \$38 million. As expected, using the upper estimate method sets lower performance targets in this case. This comparison really highlights the potential difference that your team can make in maximizing the return on the cost of incentives for these projects.

Pro Forma Statement of Impacts

Case Summary

Case #20180216103949987738

Case description: Wooster 2015 Luk and GOJO case

Local purchasing basis: Capacity constrained

CBSA: Wooster, OH

Economic Activities:

\$ 10,363,452 Motor vehicle transmission and power train parts manufacturing

\$ 200,717,050 Soap and cleaning compound manufacturing

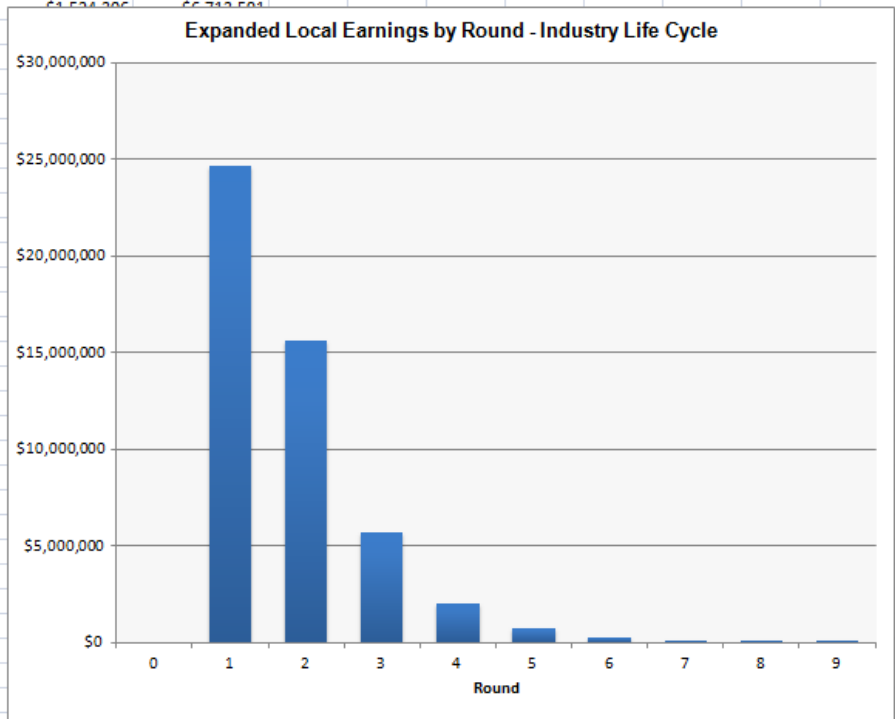
Economic Impact	Output	Employment	Value Added	Earnings
Direct	\$211,079,918	581	\$101,642,983	\$24,692,348
Life Cycle				
Industry Supply (Indirect)	\$97,584,973	579	\$48,036,039	\$24,505,875
Household Spending (Induced)	\$71,569,001	688	\$42,866,819	\$19,447,754
Combined	<u>\$380,233,892</u>	<u>1,847</u>	<u>\$192,545,841</u>	<u>\$68,645,977</u>
Direct Effect Multipliers	1.8	3.18	1.89	2.78
Final Demand Multipliers	1.8	8.8	0.91	0.33

Regional Metrics	Amount
Payments to Households (\$)	\$72,715,815
In-Commuting Percentage (%)	0
Output Expansion Percentage (%)	3.97
Local Energy Use (mmBtu)	885,062
CO2 Emissions From Energy Use (lbs. CO2e)	124,000,374

By tracing connections using a round-by-round approach, the economic accounting system breaks down the end results by round and key individual demand/supply connections. This level of reporting gives economic development professionals an appreciation for the interconnectedness of the local, state, and rest of world economic systems and the many local connections upon which the results depend. The following figure shows the round-by-round results for earnings. As in this example, it is typical for impacts to mostly be accounted for in the initial four rounds of economic activity back through the supply chain and forward through the spending of income.

Statement of Earnings, By Round

Local and State Earnings Impacts, By Round				
Round	Expanded Local Earnings - Industry LC	Expanded Local Earnings - Combined LC	Expanded State Earnings - Industry LC	Expanded State Earnings - Combined LC
0	\$0	\$0	\$0	\$0
1	\$24,692,348	\$24,692,348	\$24,692,348	\$24,692,348
2	\$15,589,085	\$15,589,085	\$20,369,009	\$20,369,009
3	\$5,684,771	\$10,530,393	\$11,111,956	\$16,459,888
4	\$2,055,637	\$6,449,039	\$5,929,824	\$12,290,035
5	\$745,508	\$4,175,981	\$3,048,135	\$9,167,623
6	\$272,279	\$2,627,725	\$1,534,306	\$6,733,583
7	\$99,961	\$1,673,874	\$514,306	\$4,713,583
8	\$36,878	\$1,059,808	\$191,306	\$3,100,583
9	\$13,661	\$674,081	\$70,306	\$2,000,583
10	\$5,077	\$427,879	\$25,306	\$1,300,583
11	\$1,892	\$271,966	\$9,306	\$800,583
12	\$706	\$172,751	\$3,306	\$500,583
13	\$264	\$109,775	\$1,106	\$300,583
14	\$99	\$69,742	\$406	\$190,583
15	\$37	\$44,314	\$156	\$120,583
16	\$14	\$28,155	\$66	\$70,583
17	\$5	\$17,889	\$26	\$40,583
18	\$2	\$11,366	\$16	\$20,583
19	\$1	\$7,222	\$10	\$10,583
20	\$0	\$4,589	\$0	\$0,583
21	\$0	\$2,915	\$0	\$0,583
22	\$0	\$1,852	\$0	\$0,583
23	\$0	\$1,177	\$0	\$0,583
24	\$0	\$748	\$0	\$0,583
25	\$0	\$475	\$0	\$0,583
26	\$0	\$302	\$0	\$0,583
27	\$0	\$192	\$0	\$0,583
28	\$0	\$122	\$0	\$0,583
29	\$0	\$77	\$0	\$0,583
30	\$0	\$49	\$0	\$0,583
31	\$0	\$31	\$0	\$0,583
32	\$0	\$20	\$0	\$0,583
33	\$0	\$13	\$0	\$0,583
34	\$0	\$8	\$0	\$0,583
35	\$0	\$5	\$0	\$0,583



Also included in the pro forma workbook are impacts on local system attributes such as resilience and regeneration, and energy use and associated emissions. These additional pro forma statements provide a broader accounting of economic system impacts, going beyond just standard impact metrics such as job creation and earnings to support the multi-criteria planning functions within government. Stabilization factors, such as resource conservation, resilience to recover from disasters, and the ability of the economy to regenerate itself from generation to generation are also important, as are workforce and employment attributes, such as occupational diversity. Economic life cycle accounting tools track the impacts on these broader dimensions of economic system health, as shown below on the resilience capacity worksheet. The local growth in industries shown on this report expand the capacity of the local economy to recover from disasters.

Expanded production in industries that play resilience role in the local economy

	A	B	C	D	E
1	Expanded production in industries that play resilience role				
2					
3	Industry	Expanded Local Production - Industry LC	Expanded Local Production - Combined LC	Expanded State Production - Industry LC	Expanded State Production - Combined LC
4	Oilseed farming	\$26,874	\$30,579	\$656,881	\$794,708
5	Grain farming	\$129,121	\$216,318	\$520,575	\$832,416
6	Vegetable and melon farming	\$3,001	\$115,747	\$5,704	\$210,556
7	Fruit and tree nut farming	\$3,094	\$114,076	\$7,327	\$254,496
8	Greenhouse, nursery, and floriculture production	\$23,003	\$127,271	\$61,955	\$234,707
9	Other crop farming	\$52,878	\$100,030	\$171,741	\$312,417
10	Dairy cattle and milk production	\$2,544	\$76,333	\$17,728	\$329,152
11	Beef cattle ranching and farming, including feedlots	\$116,161	\$409,617	\$152,314	\$679,997
12	Poultry and egg production	\$9,628	\$181,658	\$16,107	\$311,619
13	Animal production, except cattle and poultry and egg	\$38,961	\$154,560	\$60,417	\$282,449
14	Forestry and logging	\$78,097	\$118,263	\$433,923	\$571,560
15	Fishing, hunting and trapping	\$0	\$0	\$12,041	\$152,197
16	Support activities for agriculture and forestry	\$36,004	\$87,914	\$174,552	\$317,467
17	Oil and gas extraction	\$1,637,072	\$2,097,420	\$10,805,182	\$14,695,426
18	Coal mining	\$0	\$0	\$660,108	\$853,042
19	Copper, nickel, lead, and zinc mining	\$0	\$0	\$0	\$0
20	Iron, gold, silver, and other metal ore mining	\$0	\$0	\$409,921	\$484,497
21	Stone mining and quarrying	\$0	\$0	\$70,525	\$113,075
22	Other nonmetallic mineral mining and quarrying	\$386,221	\$401,380	\$502,688	\$547,831
23	Drilling oil and gas wells	\$2,390	\$2,510	\$3,999	\$4,715
24	Other support activities for mining	\$67,414	\$79,366	\$280,950	\$371,984
25	Electric power generation, transmission, and distrib	\$1,677,567	\$3,032,972	\$2,679,690	\$5,090,501
26	Natural gas distribution	\$1,245,913	\$1,691,951	\$2,164,183	\$3,065,321
27	Water, sewage and other systems	\$0	\$0	\$70,796	\$162,565
28	Nonresidential maintenance and repair	\$724,466	\$1,135,701	\$1,370,416	\$2,248,683
29	Residential maintenance and repair	\$19,271	\$439,935	\$31,353	\$696,266
30	Health care structures	\$0	\$0	\$0	\$0
31	Manufacturing structures	\$0	\$0	\$0	\$0
32	Power and communication structures	\$0	\$0	\$0	\$0

Following is a list of the accounting statements included in the pro forma workbook delivered by this app. The full workbook is available for download at decisioncommerce.com/dcgabatement.html.

Listing of Reports in Pro Forma Impact Workbook

- Impact Summary
- Local and State Earnings Impact, By Round
- Local and State Earnings Payments, By Round
- Output and Employment Impacts, By Round
- Local Sector Output, By Round
- Output By Industry

Gross Local Product, By Industry
Local Industry Demand
Workforce Employment, By Requirements
Industry Demand for College Workforce
Industry Demand for Self-Employed Workforce
Employment in Industries That Provide Occupational Variety
Expanded Production in Industries that Play Resilience Role
Expanded Production in Industries that Play Regeneration Role
Local Energy Use and Associated Emissions Commodity Requirements
Potential Top Local Connections

Performance improvement process

The pro forma statements represent the starting point for the performance improvement process. The action plan consists of 1) making potential connections a reality where local capacity exists, and 2) recruiting new capacity to serve new local demand. Both of these efforts will raise the benefits gained from these expansion projects over levels based on current connection patterns in the economy, thereby increasing the so-called economic multipliers for these projects beyond what may be reported by regional impact models that base impacts on current trade patterns.

To support making potential connections a reality, the Top Connections report (a portion of which is shown on the next page) lists the largest industry-to-industry and industry-to-labor connections for these projects. Achieving the pro forma impacts relies on these local-to-local connections being made between supply and demand. The action plan consists of using this list of top connections to create work tasks for economic development professionals to build relationships within the local economy. For labor connections, this may require forming relationships between local training programs and companies, while for industry the process of creating relationships may be combined with on-going retention visitation efforts. In both cases, this added information on the tracking of individual demand/supply connections provides valuable information for improving the performance of the local economy.

Statement of Top Local Connections

Industry	Commodity	Round	Local Production Requirements	Local Expansion Capacity
Soap and cleaning compound manufacturing	Soap and cleaning compound manufacturing	0	\$21,798,147	\$440,720
Soap and cleaning compound manufacturing	Compensation of employees	0	\$12,044,975	\$385,869,800
Soap and cleaning compound manufacturing	Management of companies and enterprises	0	\$9,247,459	\$17,658,640
Soap and cleaning compound manufacturing	Wholesale trade	0	\$7,497,509	\$86,761,640
Management of companies and enterprises	Compensation of employees	1	\$5,606,956	\$385,869,800
Soap and cleaning compound manufacturing	Other plastics product manufacturing	0	\$5,354,217	\$10,401,720
Soap and cleaning compound manufacturing	Other basic organic chemical manufacturing	0	\$5,298,027	\$0
Soap and cleaning compound manufacturing	Other basic inorganic chemical manufacturing	0	\$4,800,336	\$10,497,200
Soap and cleaning compound manufacturing	Paperboard container manufacturing	0	\$4,671,898	\$19,237,680
Soap and cleaning compound manufacturing	Petroleum refineries	0	\$3,331,332	\$0
Soap and cleaning compound manufacturing	Plastics bottle manufacturing	0	\$3,118,602	\$0
Wholesale trade	Compensation of employees	1	\$2,868,060	\$385,869,800
Motor vehicle transmission and power train parts m	Compensation of employees	0	\$1,809,901	\$385,869,800
Soap and cleaning compound manufacturing	Other retail	0	\$1,509,134	\$38,148,880
Other plastics product manufacturing	Plastics material and resin manufacturing	1	\$1,363,590	\$24,336,400
Other basic organic chemical manufacturing	Petrochemical manufacturing	0	\$1,322,244	\$0
Soap and cleaning compound manufacturing	All other chemical product and preparation manufa	0	\$1,280,362	\$25,182,600
Soap and cleaning compound manufacturing	Toilet preparation manufacturing	0	\$1,268,318	\$0
Soap and cleaning compound manufacturing	Truck transportation	0	\$1,232,184	\$36,065,400
Soap and cleaning compound manufacturing	Lessors of nonfinancial intangible assets	0	\$1,208,114	\$1,604,920
Soap and cleaning compound manufacturing	Coating, engraving, heat treating and allied activitie	0	\$1,159,954	\$749,020
Paperboard container manufacturing	Paperboard mills	1	\$1,147,882	\$0
Other plastics product manufacturing	Compensation of employees	1	\$1,028,494	\$385,869,800
Paperboard container manufacturing	Compensation of employees	1	\$1,007,534	\$385,869,800
Paperboard container manufacturing	Paper mills	1	\$960,221	\$0
Soap and cleaning compound manufacturing	Machine shops	0	\$858,916	\$3,397,100
Soap and cleaning compound manufacturing	Printing	0	\$834,845	\$1,687,800

To support recruiting new production capacity to serve local demand, the Local Industry Demand statement lists for each industry the increased demand, local output, and imports linked to the economic development projects. A portion of this statement, sorted from largest to smallest by the Expanded Imports – Combined LC column is included below. This accounting statement supports performance improvement by identifying industries where insufficient local capacities exist to meet the new demand. The action plan consists of defining economic development tasks for business development professionals to recruit startup operations or existing businesses to locate operations in the local area, using local demand as an incentive. These efforts will result in increased benefits over time as more local supply chain connections are established.

Pro Forma Statement of Industry Demand

Industry	Expanded Industry Demand - Industry LC	Expanded Local Output - Industry LC	Expanded Imports - Industry LC	Expanded Industry Demand - Combined LC	Expanded Local Output - Combined LC	Expanded Imports - Combined LC
Soap and cleaning compound manufacturing	\$200,861,767	\$181,287,926	\$19,573,841	\$201,035,657	\$181,287,926	\$19,747,731
Petroleum refineries	\$6,981,104	\$86,830	\$6,894,274	\$8,973,553	\$86,830	\$8,886,722
Other basic organic chemical manufacturing	\$11,494,680	\$4,328,222	\$7,166,458	\$11,620,890	\$4,328,222	\$7,292,668
Plastics bottle manufacturing	\$3,217,360	\$0	\$3,217,360	\$3,233,144	\$0	\$3,233,144
Petrochemical manufacturing	\$2,658,441	\$0	\$2,658,441	\$2,705,878	\$0	\$2,705,878
Toilet preparation manufacturing	\$9,749,059	\$7,492,968	\$2,256,091	\$9,962,099	\$7,492,968	\$2,469,131
Iron and steel mills and ferroalloy manufacturing	\$1,657,865	\$0	\$1,657,865	\$1,747,962	\$0	\$1,747,962
State and local general government	\$157,495	\$0	\$157,495	\$1,624,304	\$0	\$1,624,304
Paperboard mills	\$1,523,669	\$0	\$1,523,669	\$1,575,156	\$0	\$1,575,156
Paper mills	\$1,285,261	\$0	\$1,285,261	\$1,451,652	\$0	\$1,451,652
Pharmaceutical preparation manufacturing	\$924,549	\$777,076	\$147,473	\$2,083,170	\$777,076	\$1,306,094
Coating, engraving, heat treating and allied activities	\$1,696,844	\$749,020	\$947,824	\$1,733,579	\$749,020	\$984,559
Metal can, box, and other metal container (light gauge)	\$902,592	\$0	\$902,592	\$952,978	\$0	\$952,978
Funds, trusts, and other financial vehicles	\$21,027	\$0	\$21,027	\$833,928	\$0	\$833,928
Lessors of nonfinancial intangible assets	\$2,157,061	\$1,604,920	\$552,141	\$2,369,713	\$1,604,920	\$764,793
Semiconductor and related device manufacturing	\$661,809	\$0	\$661,809	\$749,697	\$0	\$749,697
Light truck and utility vehicle manufacturing	\$57,349	\$52,574	\$4,775	\$764,275	\$52,574	\$711,701
Data processing, hosting, and related services	\$468,402	\$0	\$468,402	\$662,341	\$0	\$662,341
Apparel manufacturing	\$19,525	\$0	\$19,525	\$658,481	\$0	\$658,481
Soybean and other oilseed processing	\$552,537	\$0	\$552,537	\$607,487	\$0	\$607,487
Postal service	\$305,963	\$0	\$305,963	\$578,671	\$0	\$578,671
Other petroleum and coal products manufacturing	\$1,349,338	\$859,571	\$489,767	\$1,385,922	\$859,571	\$526,351
Business support services	\$461,558	\$182,720	\$278,838	\$664,020	\$182,720	\$481,300
Polystyrene foam product manufacturing	\$453,978	\$0	\$453,978	\$478,811	\$0	\$478,811
Nonferrous metal foundries	\$705,622	\$265,120	\$440,502	\$717,943	\$265,120	\$452,823
Automobile manufacturing	\$591,754	\$567,566	\$24,188	\$1,012,753	\$567,566	\$445,187
Metal tank (heavy gauge) manufacturing	\$376,937	\$0	\$376,937	\$379,275	\$0	\$379,275

Auditing and assurance process

The new breed of economic life cycle accounting tools supports the auditing and assurance process for reporting economic system impacts in three ways:

1. By providing a listing of top connections, auditors can investigate a sample of these key connections to determine the likelihood that the pro forma impacts are realized. If discrepancies are found, the life cycle difference in local production for that industry can be determined by entering the difference into the web app and subtracting the pro forma totals from the original totals in the workbook. For example using Line 6 in the Top Local Connections Statement above, if GOJO as the soap and cleaning compound manufacturer in the initial Round 0 purchases only \$1.5 million in other plastics products from local manufacturers instead of the pro forma amount of \$5.35 million, the difference of 3.85 million can be entered for the Other Plastics Product Manufacturing industry and the pro forma results adjusted to reflect the actual purchasing amount by GOJO.

2. By providing round-by-round details that underlie the pro forma benefits, local economic officials can use their knowledge of the local business community to identify where pro forma demand/supply transactions do not match their local situation. Having this detailed information gives officials assurance that the pro forma statements of impacts are realistic when applied to their local area or, if not, can adjust the pro forma statements accordingly. For example, looking at Line 3 in the Pro Forma Statement of Industry Demand above, economic development staff may have knowledge that the only local nonferrous metal foundry closed at the beginning of the year. Just as in the case of the audit example above, the \$4.3 million in pro forma local production can be submitted through the web app to calculate the life cycle impact of this lost production. The pro forma amount for the 2015 Wooster case can then be adjusted by subtracting the life cycle impact of the closing of the foundry.
3. By providing an accounting of impacts back through the supply chain and forward through the spending of income, the tools provide a comprehensive reporting of impacts, compared to a partial reporting if only the direct rather than the entire life cycle impacts are accounted for. Often only the direct impacts are reported, as is the case in the 2015 City of Wooster Economic Development Report. The life cycle impacts, in this case, remain hidden from decision-makers and citizens.

This process of review and auditing assures government officials and the public that economic impacts reported in GASB77 notes to the CAFR or in an annual sustainability report are valid given current knowledge and review by an independent party.

Implementing economic life cycle accounting systems

Government professionals tasked with economic development functions work across finance, planning, and economic development departments. To integrate the new breed of economic accounting systems with the work processes that cut across these departments requires using the language and tools of these government financial and planning professionals. These professionals use financial accounting, geographic-based planning systems, project management, and spreadsheets daily to perform their work processes.

Implementing new systems can be as simple as using online economic accounting apps to create planning and management workbooks as shown in the example in this paper. For organizations that are moving away from working with lots of spreadsheets scattered across the organization, implementation can include integrating an economic accounting system with an organization's financial accounting system. This integration has the added benefit of not only supporting the economic development performance

management and reporting process, but also supporting tax revenue budgeting based on local life cycle connections, and reporting the local economic contribution of government purchasing.

A similar approach can be considered for implementing economic accounting systems to support local planning processes. Planners use geographic information systems (GIS) and associated modules as their primary tools of the trade. With the sustainability initiative of the American Planning Association, these tools need to include economic life cycle accounting to cover the economic dimension of sustainability. The simplest implementation is to create economic multi-criteria scores for different planning scenarios using an online app, and then manually incorporating this economic dimension with the other dimensions of planning. The alternative is to link the economic accounting engine to a GIS through an application programming interface (API), effectively creating a GIS module that performs life cycle accounting within a geographic area. This integration allows for planning professionals to get the multi-criteria information they need about the impacts of potential site uses on the local economic system, and do so within the software systems that they are familiar with.