

LOCAL ECONOMIC AND EMPLOYMENT IMPACTS OF MICHIGAN TECH'S EXTERNALLY SPONSORED PROGRAMS: FY2001 THROUGH FY2006

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The primary goal of MTU's efforts to secure externally sponsored programs is to support the educational, research, and outreach missions of the University. The primary results of these programs are educational opportunities for students, scholarly products, and public service programs. The acquisition of external financial resources supports new educational program development, research facilities, efforts to increase campus diversity, and many other innovative programs.

The financial resources acquired from external sponsors are inputs that allow these activities to occur on campus. Such financial resources are not in themselves products or results of scholarly or educational activities. Expenditure of these funds provide salary, wage, and benefits for University employees and students, tuition and fellowship opportunities for undergraduate and graduate students, acquisition of capital equipment for teaching and research activities, and many other activities in support of the sponsored programs. These activities have both direct and indirect financial impacts on the local economy, and both directly support university employment and indirectly support employment in the local community through the provision of goods and services to the university in support of these programs.

While explicitly recognizing that local economic impacts are not the primary goal of externally sponsored activities at MTU, this report attempts to summarize the economic and employment benefits of such activities to Houghton County.

MICHIGAN TECH'S EXTERNALLY SPONSORED PROGRAMS

Faculty, staff, and students acquire external resources in support of all facets of the University mission. These external funds support research, education/training, and public service/outreach activities across campus. From FY2001 through FY2006, between 88% and 92% of the external resources were expended in support of research, between 7% and 9.5% in support of public service activities, and the remainder spent in support of instruction, student services, student support, and other activities². Analyses presented here consider all externally sponsored programs, regardless of the use of the

¹ The author thanks Drs. A. Brokaw, J. Gale, and T. Merz for their valuable information and discussion regarding the methods applied here and their interpretation, as well as their review of a draft of this report.

² Derived from information presented at:

http://www.admin.mtu.edu/acct/dept/research/spons_prog.html

funds. These results, therefore, combine the impacts from externally sponsored research, education/training, and public service/outreach activities.

TYPES OF LOCAL ECONOMIC AND EMPLOYMENT IMPACTS FROM UNIVERSITY SPONSORED PROGRAMS

There are several types of local economic and employment impacts from Michigan Tech's sponsored program activities:

- Direct impacts from the expenditure of funds at the university.
- Indirect impacts resulting from commercialization of University-developed technologies, whether through licenses to existing businesses or start-up companies. These impacts include sales revenue as well as licensing and royalty income to the university.
- Induced impacts in Houghton County resulting from University expenditure of external funds and by local firms commercializing university technologies.
- Employment directly associated with university sponsored programs as well as induced employment in the local community. There is also employment in local companies commercializing university technology, but it is difficult to estimate the number of jobs directly due to university technology as opposed to other corporate activities³, and this employment will not be discussed in this report.

The direct and indirect impacts are estimated in the following sections. This discussion, in many ways, mirrors a state-level analysis of the economic impacts of Michigan's public universities published by the Michigan Economic Development Corporation in 2002⁴, and a similar analysis conducted in Wisconsin in 2004⁵. The results presented here focus only on Michigan Tech's impact on Houghton County, and only consider the local economic and employment impacts of financial resources acquired from external sources. In 1974, Gale and Jambekar⁶ presented a more comprehensive analysis of the complete local economic impacts of Michigan Tech, including things such as tax revenue to local governmental units and other factors. The analyses here are not as complete as those of Gale and Jambekar since they focus only on external funding, and do not consider the impacts of internal funds derived from sources such as tuition revenue or state appropriations. Here, an estimate is derived of the overall local economic and employment impact of externally sponsored programs, but detailed impacts (such as a breakdown of tax revenue) are not considered.

³ Lowe, R.A., and S.K. Quick. 2004. Measuring the impact of university technology transfer: a guide to methodologies, data needs, and sources. J AUTM 16: 43-59.

⁴ Michigan Economic Development Corporation. 2002. Economic Impact of Michigan's State Universities. <http://medc.michigan.org/cm/attach/D27E837E-0740-4668-8C5F-2D2E3B11DF1C/univimpactreport.pdf>

⁵ Wisconsin Technology Council. 2004. The Economic Value of Academic Research and Development in Wisconsin. Wisconsin Technology Council, Madison.

⁶ Gale, J., and A. Jambekar. 1974. The Economic Impact of Michigan Technological University on Houghton County. Unpublished report.

External sponsors provide funding to MTU to accomplish specified goals and objectives. In some cases, MTU agrees to match external funds with internal university funds. Analyses here only consider the funding acquired from external sponsors, and do not include internal matching funds. This results in a somewhat conservative analysis of the impact of externally sponsored university programs, but it does isolate the impacts of the external funding.

Direct Local Economic Impacts of MTU Sponsored Program Expenditures

Direct local impacts result from University expenditure of external funds in support of program goals and objectives. These expenditures are almost always specified in advance through project budgets provided to and approved by the external sponsors. Specific budget categories and detail vary by sponsor; expenditure categories considered here are those that are tracked in the MTU accounting system and may not correspond exactly to sponsor categories or project budgets.

Revenue from various types of sponsors and categories of fund expenditures for FY2001 through FY2006 are given in Table 1. The majority (73% - 78%) of external funds come from various federal agencies. The majority of the remaining funds (17% - 22%) are acquired from industry and other sources. The remainder comes from state and local governments. The percentage acquired from the various sponsor types varies somewhat from year-to-year. Industrial funding, for example, is impacted by economic cycles that are external to the University-industry relationship.

Sponsored program expenditures fall into two categories: direct and indirect. Direct project expenditures are included in project budgets and are for activities and items that can be directly attributed to support of project goals and objectives. Indirect project expenditures cover items that are in support of externally sponsored projects, but which cannot be attributed to individual projects. Examples of this include the costs of the offices of Research and Sponsored Programs and Research Accounting. Those two offices deal almost solely with externally sponsored projects, but the activities cannot be reasonably broken down by individual project. Similarly, utilities and space can often be identified as supporting external activities, but expenditures cannot easily be broken down by individual projects. Collectively, these indirect expenditures are referred to as Facilities and Administrative costs that are assessed to project sponsors at a rate that is negotiated with federal auditors⁷.

⁷ The current MTU negotiated rate agreement can be found at:
http://www.admin.mtu.edu/research/sprot/ratmtu/MTU_FY06_FB_Rates.pdf

Table 1. MTU sponsored program expenditures net of cost share revenue and expense, FY01 through FY06^a.

| Category | FY01 | FY02 | FY03 | FY04 | FY05 | FY06 |
|---------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Revenue | | | | | | |
| Federal Contracts/Grants | \$18,083,014 | \$19,428,042 | \$18,575,652 | \$19,764,386 | \$21,715,454 | \$21,430,844 |
| State/Local Contracts/Grants | 941,832 | 1,361,633 | 1,698,902 | 1,394,331 | 735,211 | 856,343 |
| Industry and Other Private | 5,619,557 | 4,879,836 | 4,997,390 | 4,474,482 | 5,555,611 | 5,263,566 |
| Total Revenue | 24,644,403 | 25,669,511 | 25,271,944 | 25,633,199 | 28,006,276 | 27,550,753 |
| Expenses | | | | | | |
| Salaries and Wages | 9,705,134 | 10,018,859 | 9,775,835 | 9,692,154 | 10,149,419 | 10,147,188 |
| Fringe Benefits | 2,264,236 | 2,259,161 | 2,158,689 | 2,080,137 | 2,002,295 | 2,130,511 |
| Tuition/Fellowships | 1,675,312 | 1,513,110 | 1,917,861 | 1,692,711 | 1,969,575 | 1,667,779 |
| Capital Expenditures | 1,516,251 | 2,063,128 | 890,300 | 996,727 | 972,749 | 367,415 |
| Contracted Services | 1,824,069 | 1,347,424 | 1,597,469 | 1,890,178 | 3,184,787 | 2,593,003 |
| Internal Services | 762,258 | 777,744 | 768,034 | 774,007 | 607,290 | 597,170 |
| Supplies & Materials | 884,432 | 1,214,701 | 1,702,642 | 1,827,883 | 1,953,070 | 2,153,373 |
| Travel | 1,260,328 | 1,280,235 | 1,199,238 | 1,213,575 | 1,355,503 | 1,450,514 |
| Other | 118,708 | 145,031 | 263,714 | 829,176 | 182,451 | 189,410 |
| Subtotal Expenditures | 20,010,728 | 20,619,393 | 20,273,782 | 20,996,548 | 22,377,139 | 21,296,363 |
| Facility & Administrative Costs | 4,761,815 | 5,046,585 | 4,902,249 | 5,067,202 | 5,599,211 | 6,008,676 |
| Total Expenditures | \$24,772,543 | \$25,665,978 | \$25,176,031 | \$26,063,750 | \$27,976,350 | \$27,305,039 |

^a These values only include funding received from outside entities; internal cost share and institutional expenditures are not included here. For more detail, see:

<http://www.admin.mtu.edu/rgs/research/sprot/ratmtu/ExpendituresNetofCostShareRevenueandExpense01.pdf>,
<http://www.admin.mtu.edu/rgs/research/sprot/ratmtu/ExpendituresNetofCostShareRevenueandExpense02.pdf>,
<http://www.admin.mtu.edu/research/sprot/ratmtu/ExpendituresNetofCostShareRevenueandExpense03.pdf>,
<http://www.admin.mtu.edu/research/sprot/ratmtu/ExpendituresNetofCostShareRevenueandExpense04.pdf>,
<http://www.admin.mtu.edu/research/sprot/ratmtu/ExpendituresNetofCostShareRevenueandExpense05.pdf>, and
<http://www.admin.mtu.edu/research/sprot/ratmtu/ExpendituresNetofCostShareRevenueandExpense06.pdf>.

A composite average distribution of expenditures by major expense category is given in Figure 1. The expenditures in different expense categories vary from year to year; for example, salaries, wages, and fringes make up between 54% and 60% of external project expenditures from FY01 through FY06. The expenditures in other budget categories vary by a few percent from year to year. Due to this stability, the relative amount of external project funding that is expended locally is also relatively stable, though the amount varies with the total amount of external funding acquired by the University in a given year.

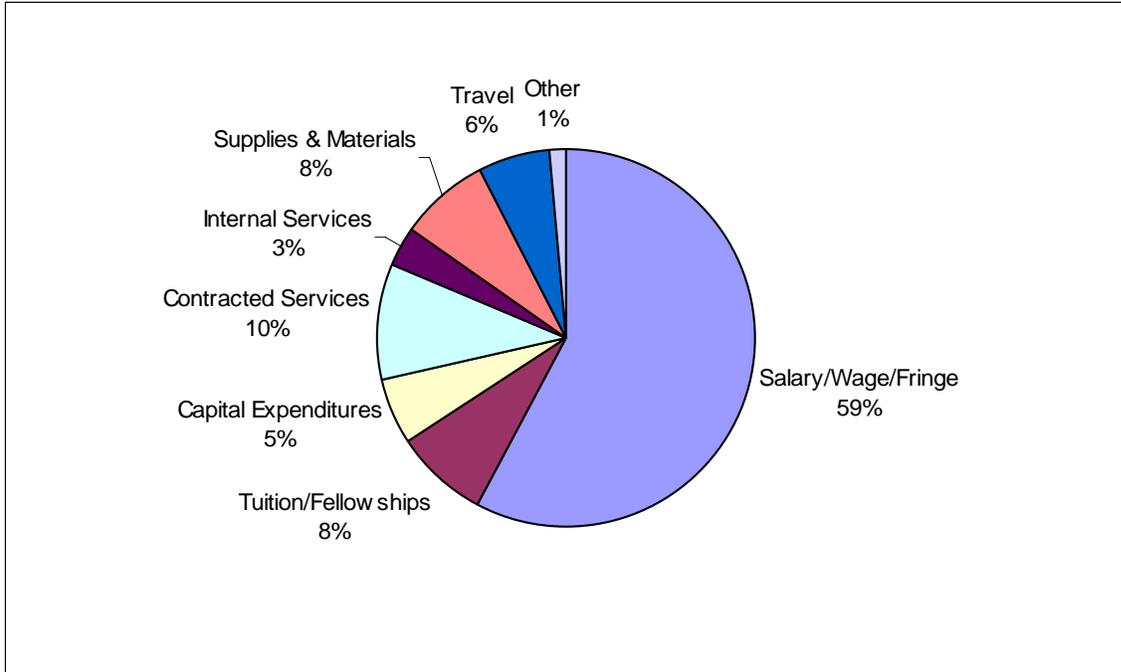


Figure 1. Composite sponsored program expenditures net of cost share revenue and expense on a percentage basis, FY01 through FY06.

Not all project expenditures are expended locally, of course, and the relative amounts expended locally vary by budget category. Funds expended outside the local area, or items purchased from vendors outside the local area, are not considered to contribute to local economic impacts of University sponsored program activities.

The proportion of expenditures in each budget category assumed to have been spent locally are given in Table 2. By category, the assumptions and rationale are given below:

Salaries and Wages. Almost all university employees receiving salary and wages from externally sponsored projects are located in the local area. There are some exceptions in that some projects require employees working on those projects to be located in other areas or even other states. The great majority of salaries and wages are paid to employees in the local area. It is assumed that 30% of employee's salaries and wages go to state and federal taxes, thus the total salary and wage is multiplied by 0.70 to estimate the local impacts.

Fringe Benefits. Fringe benefits are paid to all employees by their class of employment (regular, temporary, etc.) and do not vary by whether an employee is paid by external or internal funds. Many funds expended for fringe benefits, though, are spent outside the local area. Retirement contributions, social security payroll taxes, workers compensation, etc. are not spent locally. Most health care expenses, on the other hand, are spent locally. It is difficult to obtain an exact amount of fringe benefit expenditures that are spent locally. As an approximation, the difference between the

regular fringe benefit rate (39% for regular employees in FY01-FY03 and 41% in FY04-FY06) and the extra compensation fringe rate (25% for regular employees in FY01-FY03 and 20.2% in FY04-FY06) is considered here to be locally expended. This results in an estimate of 14/39ths of fringe benefits, or approximately 36%, as being spent locally in FY01-FY03; the corresponding fraction is 0.48 in FY04-FY06. If this assumption is in error, the precision of the resulting local economic impact estimates will be altered.

Tuition and Fellowships. The vast majority of the tuition and fellowship expenditures are for graduate student tuition charged directly to sponsored projects. These funds are transferred to the University general fund when tuition is charged, and are considered here to be locally expended. Fellowship support is essentially equivalent to salaries and wages in that it can be considered for these purposes as compensation for the recipients. As a result, all of the tuition and fellowship expenditures are assumed to be spent locally.

Capital Expenditures. Capital expenditures are spent on equipment with unit costs in excess of \$2,500. To be purchased by externally funded projects the equipment must be necessary for the completion of the project, whether it is used for research, instruction, or other purposes. Much of the capital equipment that is needed for these activities is not available from local vendors. Here, it is assumed that 25% of the capital equipment purchased in support of externally sponsored projects is acquired from local vendors. If this assumption is incorrect, the precision of the estimated local economic impacts will be altered.

Contracted Services. Sometimes, it is not possible to complete a sponsored project with the expertise and resources available at the University. In these cases, the university contracts with an outside entity, often another university, to conduct the work necessary to complete the project. There are some cases where work is contracted to local companies or service providers, but the great majority of these funds are expended outside the local area. For the sake of these analyses, it is assumed here that no funds from contracted services are spent locally.

Internal Services. Sometimes funds are transferred to other University units to provide work in support of external projects. This could include facilities modification or painting, for example. Here, funds used for internal services are all considered to have been spent locally.

Supplies and Materials. Supplies and materials are items necessary to complete a sponsored project that have a unit cost less than \$2,500. While some items are not available from local vendors (specialized chemicals, some laboratory supplies, etc.), many are available and are acquired from local vendors. For these analyses, it is assumed that 75% of supplies and materials funds are spent in acquisition from local vendors. If this assumption is incorrect, the precision of the estimated local economic impact will be altered.

Travel. Some travel funds are spent locally (commissions to travel agents, some automobile use, etc.) or induce local expenditures (airport operations, for example), but the vast majority is spent outside the local area. Taking a conservative approach for these analyses, it is assumed that no travel funds are spent locally.

Other. This is a catch-all category, and includes many different items that do not fit into any other category. For the sake of these analyses, the small amount of expenditures in this category are all assumed to have been spent locally. An error here would impact the final estimated economic impact, but it would be a very small impact due to the small amount of expenditures in this budget category.

Facility and Administrative Costs. These costs are transferred to the University general fund upon the expenditure of project funds. A fraction (approximately half) of these funds are then transferred to the various units for use in support of the growth of sponsored project activity. Some of these funds are expended in support of things like travel, but much is spent in the local area and, for the sake of these analyses, all of these expenditures are considered to have been spent locally. If this is incorrect, the precision of the final estimated local economic impact will be altered.

Applying the proportions spent locally (Table 2) in the various budget categories to the expenditures in those categories (Table 1) results in an estimate of between \$15,969,199 and \$18,295,595 in external sponsored program expenditures spent locally from FY01 through FY06 (Table 3). From this, the fraction of externally sponsored project funds spent locally was relatively stable between 64.5% and 67.0%, or approximately two-thirds of total externally sponsored project expenditures, between FY01 through FY06. These estimates are in error to the extent that the assumed fractions spent locally are in error.

Table 2. Estimated proportion of expenditures spent in Houghton County for various categories of sponsored program expenditures.

| Category | Proportion Spent Locally |
|-----------------------------------|--------------------------|
| Salaries and Wages | 0.70 |
| Fringe Benefits | 0.36/0.48 ^a |
| Tuition and Fellowships | 1.00 ^b |
| Capital Expenditures | 0.25 ^c |
| Contracted Services | 0.00 ^d |
| Internal Services | 1.00 |
| Supplies and Materials | 0.75 ^e |
| Travel | 0.00 ^f |
| Other | 1.00 ^b |
| Facility and Administrative Costs | 1.00 ^b |

^a Not all fringe benefit expenditures are spent locally; retirement benefits, social security payroll taxes, etc. are spent outside Houghton County. The estimated proportion is based on the difference between the full fringe benefit rate (39% in FY01-FY03 and 41% in FY04-FY06) and the extra compensation fringe benefit rate (25% in FY01-FY03 and 20.2% in FY04-FY06). The estimated 36% is 14/39ths of fringe benefit expenditures in FY01-FY03; the corresponding fraction is 0.48 in FY04-FY06.

^b Sponsored program expenditures that are essentially transfers between university funds (tuition, internal services, facility and administrative costs, etc.) are assumed to have been spent locally in these analyses.

^c Capital expenditures are based on items of equipment whose cost is in excess of \$2,500. Here, one-quarter of capital expenditures are assumed to be purchased from local vendors.

^d While there are some contracted services provided by local vendors, the vast majority of providers are from outside Houghton County. Here, the proportion of contracted services expended locally is assumed to be zero.

^e Supplies and materials expenditures are for the purchase of items with a unit cost of less than \$2,500. Here, three-quarters of supplies and materials expenditures are assumed to be purchased from local vendors.

^f While there is some local expenditure of travel funds, the vast majority is spent outside Houghton County and the direct local economic impact of MTU travel expenditures is assumed to be minimal.

Table 3. MTU sponsored program expenditures net of cost share revenue and expense that are estimated to have been spent locally, FY2001-FY2006.

| Category | FY01 | FY02 | FY03 | FY04 | FY05 | FY06 |
|-----------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Salaries and Wages | \$ 6,793,594 | \$ 7,013,201 | \$ 6,843,085 | \$ 6,784,508 | \$ 7,104,593 | \$ 7,103,032 |
| Fringe Benefits | 815,125 | 813,298 | 777,128 | 998,466 | 961,102 | 1,022,645 |
| Tuition and Fellowships | 1,675,312 | 1,513,110 | 1,917,861 | 1,692,711 | 1,969,575 | 1,667,779 |
| Capital Expenditures | 379,063 | 515,782 | 222,575 | 249,182 | 243,187 | 91,854 |
| Contracted Services | 0 | 0 | 0 | 0 | 0 | 0 |
| Internal Services | 762,258 | 777,744 | 768,034 | 774,007 | 607,290 | 597,170 |
| Supplies and Materials | 663,324 | 911,026 | 1,276,982 | 1,370,912 | 1,464,803 | 1,615,030 |
| Travel | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 118,708 | 145,031 | 263,714 | 829,176 | 182,451 | 189,410 |
| Facility and Administrative Costs | 4,761,815 | 5,046,585 | 4,902,249 | 5,067,202 | 5,599,211 | 6,008,676 |
| Total Local Expenditures | \$15,969,199 | \$16,735,777 | \$16,971,627 | \$17,766,164 | \$18,132,212 | \$18,295,595 |

Local Impacts Resulting From Commercialization of University-developed Technologies

MTU, like other universities, attempts to convert the results of research conducted on campus into commercial products. This is accomplished through licensing of technologies to existing or start-up companies. Those companies incorporate the technology into commercial products, and realize revenue from the sales of those products. The companies, in turn, pay royalties and/or licensing fees to the university for the rights to the technology.

When MTU receives licensing or royalty income, some is paid to the inventors of the technology, some is distributed to academic and research units, and some is retained by the university to offset the costs of protecting university-developed intellectual property. Not all inventors receiving royalties are current residents of Houghton County; several have left MTU for employment elsewhere, have retired, etc. Here, it is assumed that 75% of royalties distributed to inventors are distributed to residents of Houghton County. The amounts distributed to academic or research units are used at the unit's discretion to support research and educational programs; it is assumed here that all of these funds are spent locally. To the extent that these assumptions are incorrect, the estimated local impacts in Table 4 will also be incorrect.

Some companies licensing university technology are located in the local area. These companies report sales to the university and pay royalties on those sales that are included in the total university licensing income. These sales are reported on a calendar year basis, which is offset 6 months from the fiscal year basis used elsewhere in this report. For purposes of reporting impact in Table 4, corporate sales from

calendar year 2001 are combined with other impacts from university fiscal year 2001. This introduces imprecision into the results, but does approximate the local economic impact for the indicated year.

Table 4. Local impacts resulting from commercialization of university-developed technologies, FY2001-FY2006.

| Category | FY01 | FY02 | FY03 | FY04 | FY05 | FY06 |
|---------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 75% of Inventor Royalties | \$ 96,606 | \$ 73,989 | \$ 49,463 | \$ 31,594 | \$ 23,355 | \$ 75,620 |
| University Unit Income | 73,718 | 81,261 | 100,214 | 136,739 | 48,620 | 112,136 |
| Local Company Sales | 3,847,160 | 2,975,755 | 3,043,925 | 3,072,276 | 4,163,118 | 3,203,638 |
| Total | \$4,017,484 | \$3,131,005 | \$3,193,602 | \$3,240,609 | \$4,235,093 | \$3,391,394 |

Induced Local Economic Impacts

Induced local expenditures occur when money works its way through the local economy. Employees receive paychecks, purchase groceries, make mortgage payments, etc. Eventually money leaves the local area, but before this leakage it circulates through the community. Induced local expenditures are estimated using an income multiplier, which estimates the total amount of expenditures in Houghton County per dollar of MTU sponsored program-related local expenditure. The value for the local income multiplier is 1.46, implying that the induced local activity is 0.46 times the MTU sponsored program-related expenditures (Gale and Jambekar 1974⁸). Table 5 gives the induced local expenditures associated with the direct local impacts of MTU sponsored program activity and local university technology commercialization activities.

⁸ Multipliers such as this one are thought to be relatively stable over time, but systematic changes, such as the advent of the internet, can impact a multiplier. The multiplier given by Gale and Jambekar (1974) is used here in the absence of any better or more recent information, but the results may vary if that relationship has changed since the multiplier was developed.

Table 5. Estimated local expenditures from MTU sponsored program activities and university technology commercialization activities, with estimated associated induced local expenditures and total local impact of MTU sponsored program activities.

| Category | FY01 | FY02 | FY03 | FY04 | FY05 | FY06 |
|---|--------------|--------------|--------------|--------------|--------------|--------------|
| Total Local Expenditures ^a | \$15,969,199 | \$16,735,777 | \$16,971,627 | \$17,766,164 | \$18,132,212 | \$18,295,595 |
| Technology Commercialization ^b | 4,017,484 | 3,131,005 | 3,193,602 | 3,240,609 | 4,235,093 | 3,391,394 |
| Subtotal | 19,986,683 | 19,866,782 | 20,165,229 | 21,006,773 | 22,367,305 | 21,686,989 |
| Induced Local Expenditures ^c | 9,193,874 | 9,138,720 | 9,276,005 | 9,663,115 | 10,288,960 | 9,976,015 |
| Total Local Economic Impact | 29,180,556 | 29,005,502 | 29,441,234 | 30,669,888 | 32,656,265 | 31,663,004 |

^a The estimated total local expenditures associated with university externally sponsored programs are taken from Table 3.

^b The estimated local income associated with university technology commercialization activities are taken from Table 4.

^c The induced local expenditures are derived using an income multiplier, which is the estimated amount of total expenditures in Houghton County per dollar of local MTU expenditure. The value for the local income multiplier is 1.46, implying that the induced activity is 0.46 times the MTU sponsored program expenditures (Gale and Jambekar, 1974).

Total Estimated Local Economic Impacts

The total estimated local economic impact of university externally sponsored programs may be estimated by summing the three components considered here: local expenditures associated with university externally sponsored programs, local income associated with university technology commercialization activities, and the estimated local expenditures induced by these direct expenditures. The totals from FY2001 through FY2006 are given in Table 5 above. The total ranges from \$29,005,502 to \$32,656,265 over these years.

It is not really possible to compare this result with the local economic impacts of other sectors of the local economy. Information on the local impact of sectors such as tourism or manufacturing is not readily available. It is safe to say, though, that the approximately \$30,000,000 annual impact of university externally sponsored program activity is a major component of the total economy of Houghton County.

Estimated Employment Associated with University Sponsored Program Activity

The Association of American Universities (AAU), using methods established 30 years ago by the U.S. Department of Commerce, Bureau of Economic Analysis, estimates that 36 jobs are directly and indirectly created for every \$1,000,000 of university research activity (Wisconsin Technology Council, 2004). Other recent studies by Cleveland State University, the University of Montana, and the University of Kentucky derive estimates ranging from 40 to 45 jobs created for every \$1,000,000 of university research (Wisconsin Technology Council, 2004). These multipliers include both the jobs directly associated with university sponsored program activity (university employees) as well as those induced in the local community as a result of such activities.

Applying the lowest (36) and highest (45) values of these multipliers to the university sponsored program expenditures in Table 1 results in estimates of total employment in Houghton County associated with university sponsored program activities (Table 6). These estimates indicate that somewhere around 1,000 local jobs are associated with university sponsored program activity. As noted, these include both direct university employment as well as jobs induced in the local economy. These estimates do not include employment in local companies that have licensed MTU technologies.

Table 6. Estimated number of local jobs directly and indirectly resulting from university sponsored program activities, FY2001 through FY2006.

| | FY01 | FY02 | FY03 | FY04 | FY05 | FY06 |
|--------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| University Expenditures ^a | \$24,772,543 | \$25,665,978 | \$25,176,031 | \$26,063,750 | \$27,976,350 | \$27,305,039 |
| Employment Estimates ^b | | | | | | |
| Low | 892 | 924 | 906 | 938 | 1,007 | 983 |
| High | 1,115 | 1,155 | 1,133 | 1,173 | 1,259 | 1,229 |

^a University sponsored program expenditures are taken from Table 1.

^b The estimated high level of employment is obtained using the University of Montana multiplier of 45 jobs per \$1,000,000 of university research while the low estimate is obtained using the AAU multiplier of 36 jobs created per \$1,000,000 of university research.

SUMMARY

Local economic activity associated with MTU externally sponsored program activities is in the neighborhood of \$30,000,000 annually. This includes both direct and induced local impacts associated with university expenditures as well as local economic activity associated with university technology commercialization activities. The latter include both direct university income through licensing and royalty payments as well as revenue related to sales of MTU-related technologies by local companies that have licensed such technologies.

These activities are estimated to result in somewhere between 900 and 1,100 jobs in Houghton County. This includes direct university employment as well as induced employment in the local community. These estimates do not include employment in either existing or startup companies that have licensed university technologies.

It is not possible to directly compare these estimates with the local impacts or employment in other local economic sectors due to a lack of information. It is safe to conclude, though, that local impacts of approximately \$30,000,000 annually and associated employment of 1,000 people make university sponsored program activities a major component of the Houghton County economy.