

REPORT TO
THE DEPARTMENT OF ECONOMIC DEVELOPMENT, JOBS,
TRANSPORT AND RESOURCES, VICTORIA
DECEMBER 2018

MEDICAL TECHNOLOGIES AND PHARMACEUTICALS SECTOR IMPACT EVALUATION



EXECUTIVE SUMMARY





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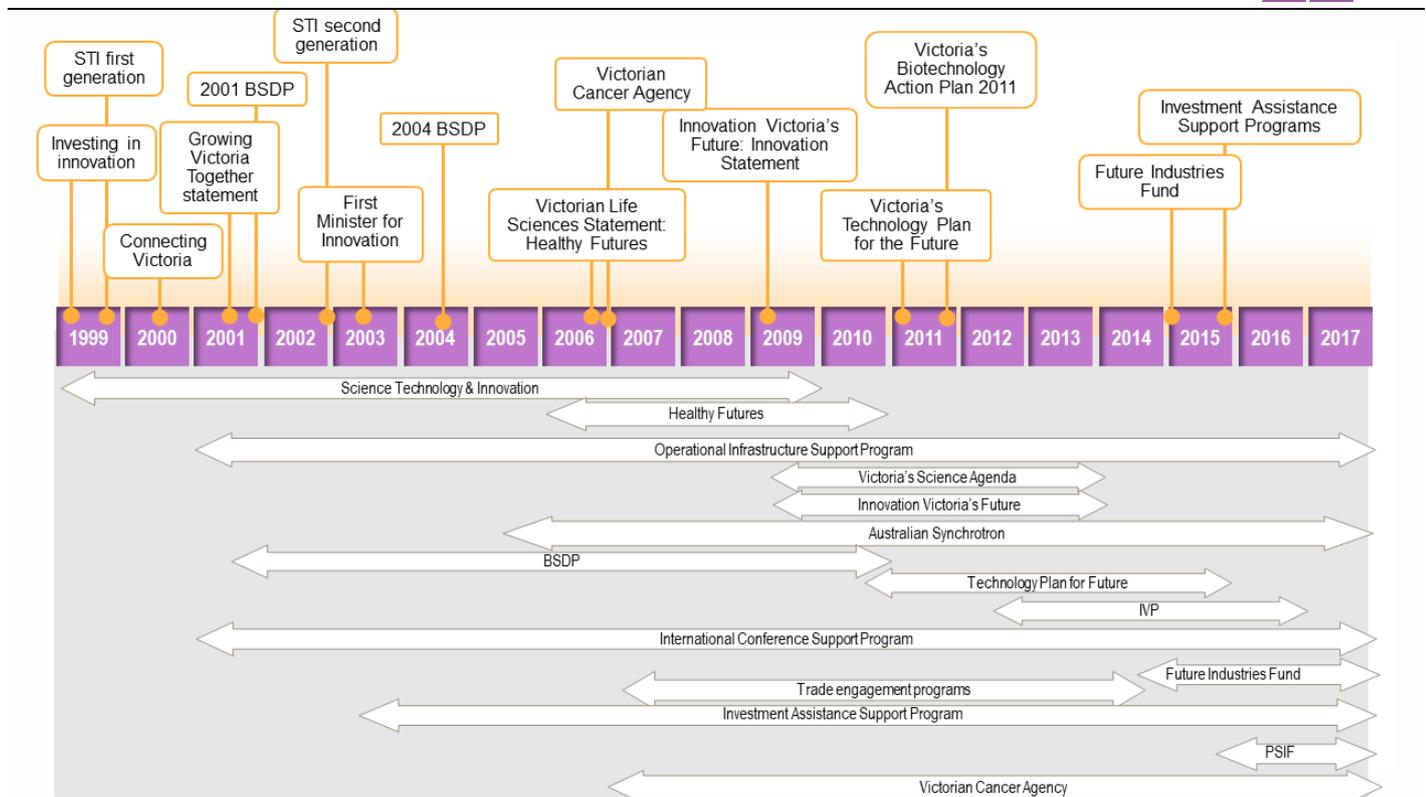
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EXECUTIVE SUMMARY

The Medical Technologies, and Pharmaceuticals (MT & P) sector is a research- and development-driven manufacturing, wholesale and research services sector that is important to the Victorian economy not only for its contribution to gross state product (GSP), gross state income (GSI) and employment, but also for the health benefits provided by its products and services. The sector is made up of more than 650 firms across the entire supply chain ranging in size from small start-ups to large Victorian exporters and global manufacturers. The firms draw on the export potential of international markets and are integral to Victoria’s innovation capability.

From 1999-00 to 2016-17 the Victorian Government invested over \$2 billion into the MT & P sector through 15 programs summarised in **Figure ES 1**.

FIGURE ES 1 A SUMMARY OF VICTORIAN GOVERNMENT INVESTMENT PROGRAMS RELATED TO THE MT & P SECTOR



SOURCE: ACIL ALLEN BASED ON VARIOUS DEDJTR SOURCES

In the early 2000's, Victorian Government investments sought to maintain Victoria's leadership in research and innovation by investing strongly in science infrastructure and capabilities. Later investments placed a stronger emphasis on building research-industry collaborations, commercialisation and sector competitiveness.

This report

This report presents an analysis of the MT & P sector over the last two decades (1999-00 to 2016-17) from two key perspectives:

- its overall size and contribution to the Victorian economy
- the relative and aggregate impact of the Victorian Government's funding to the Victorian economy and to the sector.

The analysis in this report of the Victorian Government funding to the sector is primarily an objective compilation of previously undertaken program evaluations. As such, program design and implementation issues are out of scope, as are any impacts not previously analysed such as assessments of any health benefits or the opportunity cost of the funding.

The size and contribution of the MT & P sector

In 1999-00, the revenue of the MT & P sector was \$7.5 billion in current prices. Over the subsequent seventeen years revenue increased by an average of **6.4 per cent** a year to over \$21 billion in 2016-17. This revenue contributes to the Victorian economy both directly, through direct employment and gross value-added, and indirectly, through the employment and gross value-added in their supply chain.

The economic contribution to the Victorian economy of the MT & P sector's revenue was estimated using Input-Output Multiplier Analysis (IO analysis) to account for the full linkages of the sector throughout the economy.

Over the eighteen-year period, it is estimated that the MT & P sector contributed a total of:

- Between \$166.6 billion (for direct and indirect supply chain activity) and \$231.2 billion (including consumer induced activity) to the Victorian economy. On average, this ranged between 3.3 per cent and 4.5 per cent of Victorian nominal GSP.
- Between 1.2 million and 1.5 million employee years to the Victorian labour market. On average, this ranged between 2.9 per cent and 3.8 per cent of Victorian total employment.

The impact of Victorian Government's funding

Computable general equilibrium (CGE) modelling was used to understand the relative impact of Victorian Government funding on the economy and the MT & P sector. To complement and strengthen the quantitative analysis discussions were held with a range of organisations operating in the Victorian MT & P sector. Five detailed case studies were developed to provide additional insight into how the selected MT & P programs have worked in practice and to understand lessons learned and key success factors.

A summary is provided in **Box ES 1**.

A Reference Case simulation provided the 'business-as-usual' scenario against which to compare the results of the 15 Government MT & P sector programs. The Reference Case is the historical representation of the MT & P sector and the Victorian economy in the presence of the Government programs, including baseline estimates of GSP, population, labour supply, sector output, and other relevant measures, and provides projections of endogenous variables such as productivity changes and consumer preferences. The Counterfactual Case assumed all productivity improvements, tax rates and consumer preferences changed as per the Reference Case but removed the impacts of the past Government MT & P sector programs. The difference between the Counterfactual Case and the Reference Case, provides an estimate of the net impacts of the program(s).

The \$2 billion invested by the Victorian Government via the 15 funded programs listed in **Figure ES 1** benefitted the Victorian economy through:

- the leveraging of additional investment into the MT & P sector — investment from international sources (including philanthropic organisations and the private sector) and Australian sources (including from the Commonwealth Government and interstate investors)
- productivity improvements in the MT & P sector
- productivity improvements in other sectors resulting from research benefits generated by the MT & P sector
- productivity improvements associated with more rapid and effective adoption and integration of knowledge generated because of Victorian Government funding
- increased MT & P sector revenue associated with the Victorian Government funding and associated commercialisation.

BOX ES 1 CASE STUDY FEEDBACK

Discussions were held with a number of organisations to complement and strengthen the quantitative analysis. Key feedback from these case studies was that:

- The *lead time for investment* to impact can be substantial for certain intervention types and programs, as evidenced by the expansion funding to Walter and Eliza Hall Institute (WEHI) in 2006 which resulted in substantial employment and capability improvements including capabilities that support commercialisation of outcomes such as the ultimate partial sale of venetoclax royalty rights in 2017. Additionally, the innovation grant funding to the Baker Institute in 2002 was critical in the establishment of its wholly-owned and highly successful clinical research subsidiary, Nucleus Network, subsequently sold to an Australian private equity firm in 2018 for a substantial sum.
- The *size of investment* is not necessarily the only, or best, predictor of impact, as evidenced in the case of Medicines Development Limited (MDL) which saw a modest grant for talent development result in MDL develop a strong in-house portfolio of projects, resulting from the acquired medical project management and commercialisation talent, plus strong relationships with other medical technology companies. The return to the Victorian economy has been in the form of employment, talent development and retention, and the resultant export sales.

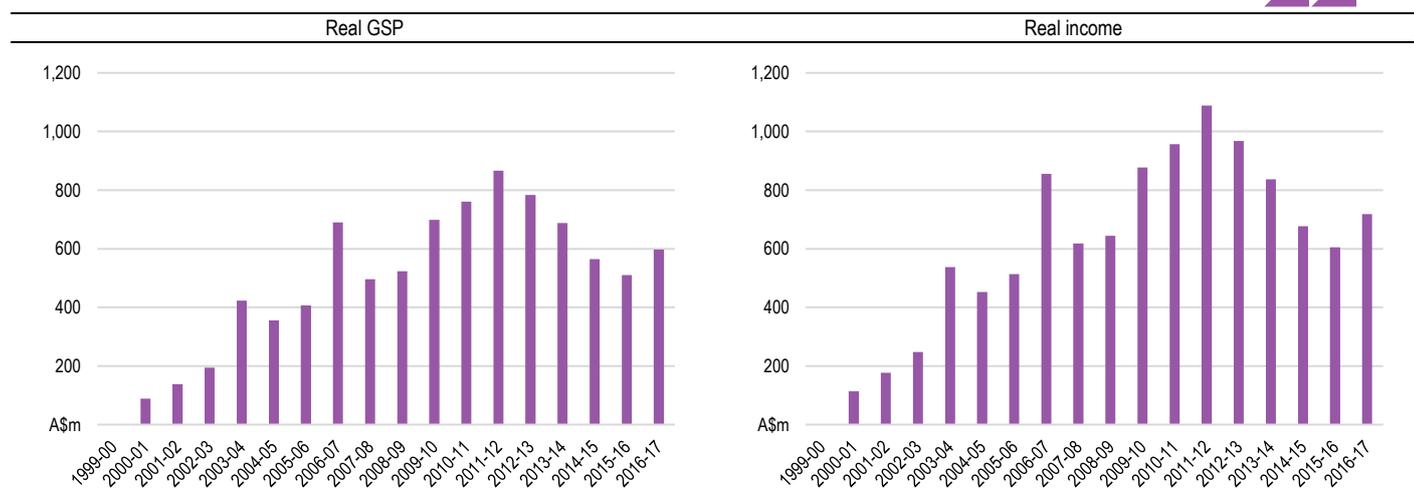
All case studies pointed to the value of conference and congress events in *attracting and developing international expertise and relationships*. They also highlighted the importance of government investment to facilitate the development of a vibrant life sciences environment, spanning research through to commercialisation.

SOURCE: ACIL ALLEN

Economic impacts

Figure ES 2 shows the impacts of the 15 funded programs on real Gross State Product (GSP) and real income (GSI) for Victoria, measured as the change between the actual Victorian economic history (with all funded programs) compared to a model of the Victorian economy where the funded programs and the impacts were removed (the counterfactual).

FIGURE ES 2 ESTIMATED CHANGE IN REAL GSP AND REAL INCOME AS A RESULT OF THE FUNDED MT & P SECTOR PROGRAMS IN VICTORIA, RELATIVE TO THE COUNTERFACTUAL CASE



Note: All dollars are in 2016-17 terms

SOURCE: ACIL ALLEN ECONOMIC MODELLING

Gross State Product (GSP) represents the total dollar value of all goods and services produced in Victoria and is a measure of the size of the economy. Real income or Gross State Income (GSI) is equal to GSP plus the income transfers between Victorian residents and residents outside of the Victoria (i.e. rest of Australia and the rest of the world). It is a measure of the ability of Victorian residents to purchase goods and services, adjusted for inflation. A rise in real income indicates a rise in the capacity for current consumption, but also an increased ability to accumulate wealth in the form of financial and other assets. It is a more complete measure of the current and future consumption possibilities available to Victorians than GSP and is a better indicator of economic welfare.

The estimated GSI impact to Victoria from the funded programs is higher than the impact of the economic output. This is mainly due to the increased investment into, and the improved export competitiveness of, the Victorian economy.

Over the eighteen-year period, the funded programs collectively are estimated to have increased:

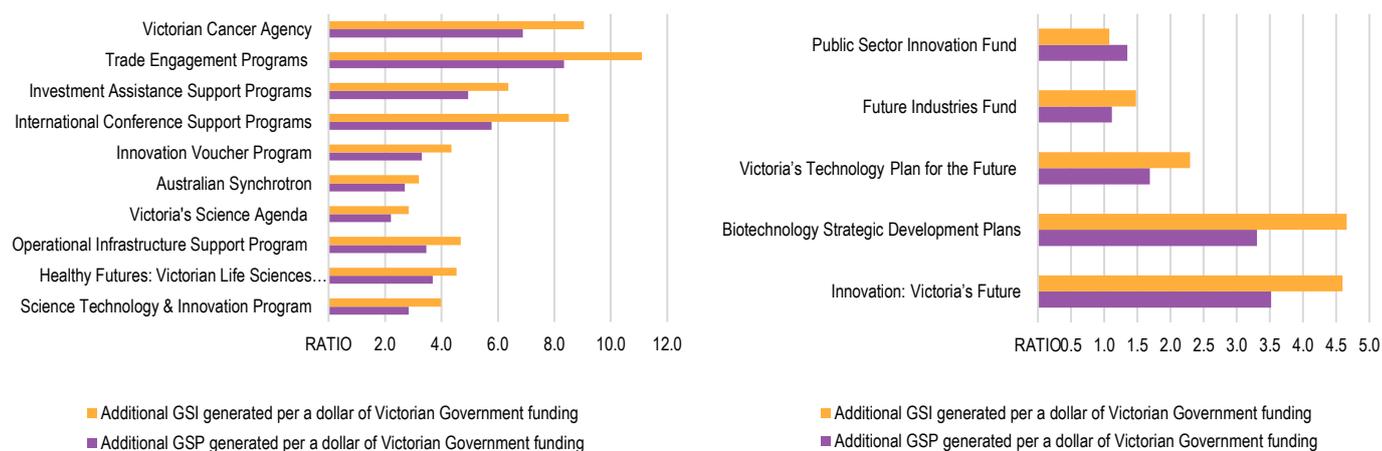
- real GSP of Victoria by a cumulative total of **\$8,786 million** (with a net present value of **\$12,131 million**, using a 7 per cent real discount rate)
- real income of Victoria by a cumulative total of **\$10,890 million** (with a net present value of **\$16,078 million**, using a 7 per cent real discount rate)
- employment by **73,717 employee years** of full-time equivalent jobs in Victoria, comprising 28,006 employee years of direct and 45,711 employee years of indirect employment.

The estimated aggregate impacts of the funded programs suggest that every \$1 dollar of Victorian Government funding into the MT & P sector generated an additional GSP of **\$3.66** and an income of **\$4.54** in Victoria greater than it would have if the funding had been allocated to general government expenditure.

A summary of the funded programs assessed in this study is provided in **Figure ES 3**. The figure shows that the ratios of GSP to the Victorian Government funding range between **1.12** for Future Industries Fund (FIF) and **8.34** for Trade Engagement Programs.

The direct benefits from a small amount of funding allocated to Trade Engagement Programs was very high and this is likely to have yielded higher macroeconomic benefits.

FIGURE ES 3 SUMMARY OF REAL GSP AND REAL INCOME IMPACTS BY PROGRAM IN VICTORIA



Notes:

- All dollars are in 2016-17 terms and 7% real discount rate.
- Economic impacts of various programs assessed in this study are not strictly comparable due to the lack of empirical evaluation data on some programs and some methodological inconsistency in economic evaluation outcomes in the past.
- The benefits estimated by previous evaluation of Victorian Cancer Agency, Trade Engagement Programs and Investment Assistance and International Conference Support appears high as a result the estimated impacts in this study are also higher.
- Some programs are new and ongoing and have limited data. The potential future benefits of these new programs have not been included in this study. The outcomes from these programs are yet to be realised and it will probably take three to seven years to realise the benefits from these new programs

SOURCE: ACIL ALLEN ECONOMIC MODELLING

Apart from the trade engagement program which was aimed at facilitating international trade for MT & P sector businesses, the estimates indicate that the other evaluated programs yielded broadly similar macroeconomic benefits.

It should also be noted that some program benefits are yet to be realised, which means the analysis underestimates a potentially significant tail end of benefits. For example, the Future Industries Fund only commenced in 2014 and it would be expected to yield higher outcomes than were able to be included in this study.

The economic impact of Victorian Government funding has also been broadly assessed by five types of intervention — infrastructure and capabilities, industry research networks and collaborations, research institute operational support, trade facilitation, and firm expansion and operations.

While there are some limitations in the data available, an indicative analysis of these interventions suggests that assistance provided to programs which focus on **trade facilitation measures** and **firm expansion and operations** have yielded high ratios of GSP to Victorian Government funding. Additional research in this area needs to be undertaken to confirm this study's findings using various firm level and industry level data sets.

The main **infrastructure and capability** related programs — Science Technology and Innovation Program, Healthy Futures Program, Victorian Science Agenda, Operational Infrastructure Support Program, Australian Synchrotron and Innovation Voucher Program — have yielded good but moderate returns compared with trade facilitation or firm expansion or operations.

Likely reasons for the relative returns include:

- the high direct economic benefits from the trade programs and direct investment assistance are influenced unevenly by a small cohort of companies
- the propensity of marginal firms to improve their export performance in response to small funding
- the analysis presented here has not included any health research benefits resulting from infrastructure capability
- the important role of infrastructure and capability in underpinning and enabling the MT & P sector to yield the high returns from firm expansion and trade facilitation is difficult to quantify and incorporate.

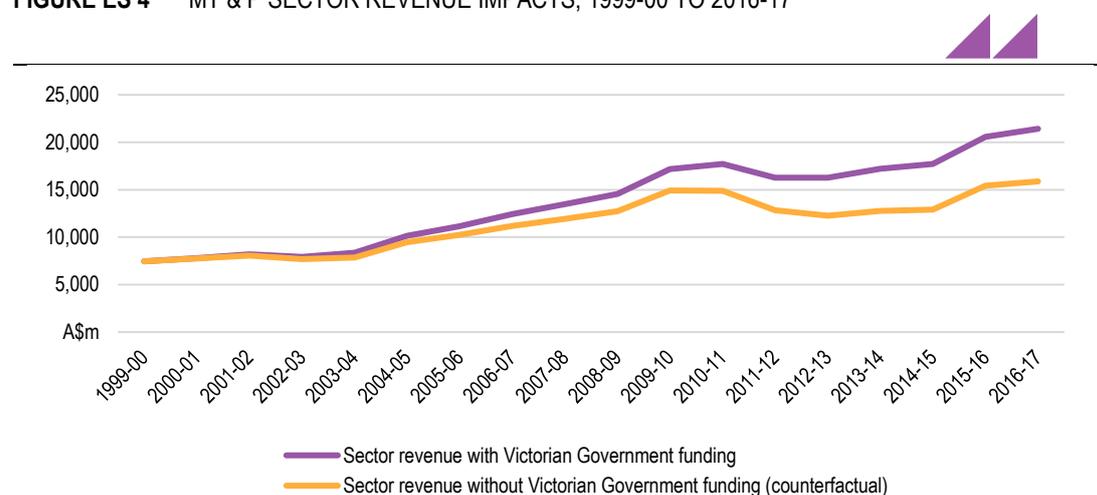
Another factor difficult to quantify is the ability for infrastructure and capability interventions to address market and innovation system failures as the MT & P sector grows further. These interventions are likely to lead to high returns, in contrast to the typically decreasing marginal benefits associated with each incremental dollar of capital and infrastructure investment by the Victorian Government.

As the MT & P sector funding programs have not been funded or assessed based on the type of intervention, the analysis presented here can help inform, but not exclusively provide, definitive guidance on future intervention strategies. The empirical analysis should be considered alongside the feedback from the case studies that industry networks and collaborations are critical for establishing a vibrant life sciences environment in which to attract and retain talent and build successful commercial partnerships. This also involves direct support to companies and service providers to improve industry performance.

The impact on the MT & P sector

It is estimated that, over the eighteen-year period analysed, cumulative MT & P sector revenue of nearly **\$39.6 billion** (in current prices) would not have been possible without the government funding to the sector (**Figure ES 4**) implying that the sector would have grown by **4.5 per cent** a year instead of the observed **6.4 per cent** a year.

FIGURE ES 4 MT & P SECTOR REVENUE IMPACTS, 1999-00 TO 2016-17



Note: All dollars are in current prices

SOURCE: ACIL ALLEN ECONOMIC MODELLING

Concluding remarks

The economic impact assessment of the funded programs has shown that there have been overall positive economic benefits of the Victorian Government investment in the MT & P sector. Moreover, given the scope of the study did not include potential technological or R&D spillovers, or the utilisation and productivity of the associated physical capital, the returns are likely to be even greater than able to be presented here.

The macroeconomic and sector impacts of the different programs and interventions in the MT & P sector studied here provide a sound evidence base to help assist future funding to be allocated in a way that maximises the return on public investment in the MT & P sector.