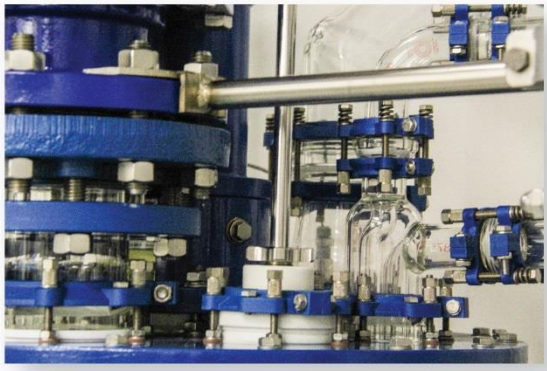
Assessing the Economics of Single-Source vs. Multi-Vendor Manufacturing



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INTRODUCTION

In recent years, single vendor contract development and manufacturing organizations (CDMOs) have presented a compelling new approach to address inefficient multi-vendor development and manufacturing approaches. There are several efficiencies promised by a single source CDMO including running multiple manufacturing steps in tandem, eliminating the need for multiple contract negotiations, limiting technology transfers, and removing the need for revalidation measures.

The Tufts Center for the Study of Drug Development (CSDD) conducted a study comparing multi- and single vendor CDMO models on cycle times and development economics to inform managers involved with clinical manufacturing decisions. We conducted comparative analyses using data from five single-source contract manufacturing projects -- three biologics (monoclonal antibodies) and two small molecule chemical entities -- and benchmark results on biopharmaceutical R&D costs and net returns for new biopharmaceutical approvals.[1,2]

METHODS

The base case for our model of the potential economic benefits from single-source contracting assumes multi-vendor contracting. Benefits from single-source contracting are measured against that base case. For the model comparisons, we assume that either single-source or multi-source contracting is applied across a diversified portfolio of investigational molecules for a given clinical phase. Thus, the results are interpreted on a per drug approval basis, taking into consideration failures during clinical development (molecules that are tested, but never reach the market).

We assumed that reductions in the length of the contracted manufacturing processes translate to initiation of a clinical phase sooner than it otherwise would by the reduction in the amount of time needed to manufacture supplies for clinical testing, but that the lengths of the clinical testing phases once initiated remain the same. This results in lower values for the time costs of new drug development (the monetized value of shorter development times).

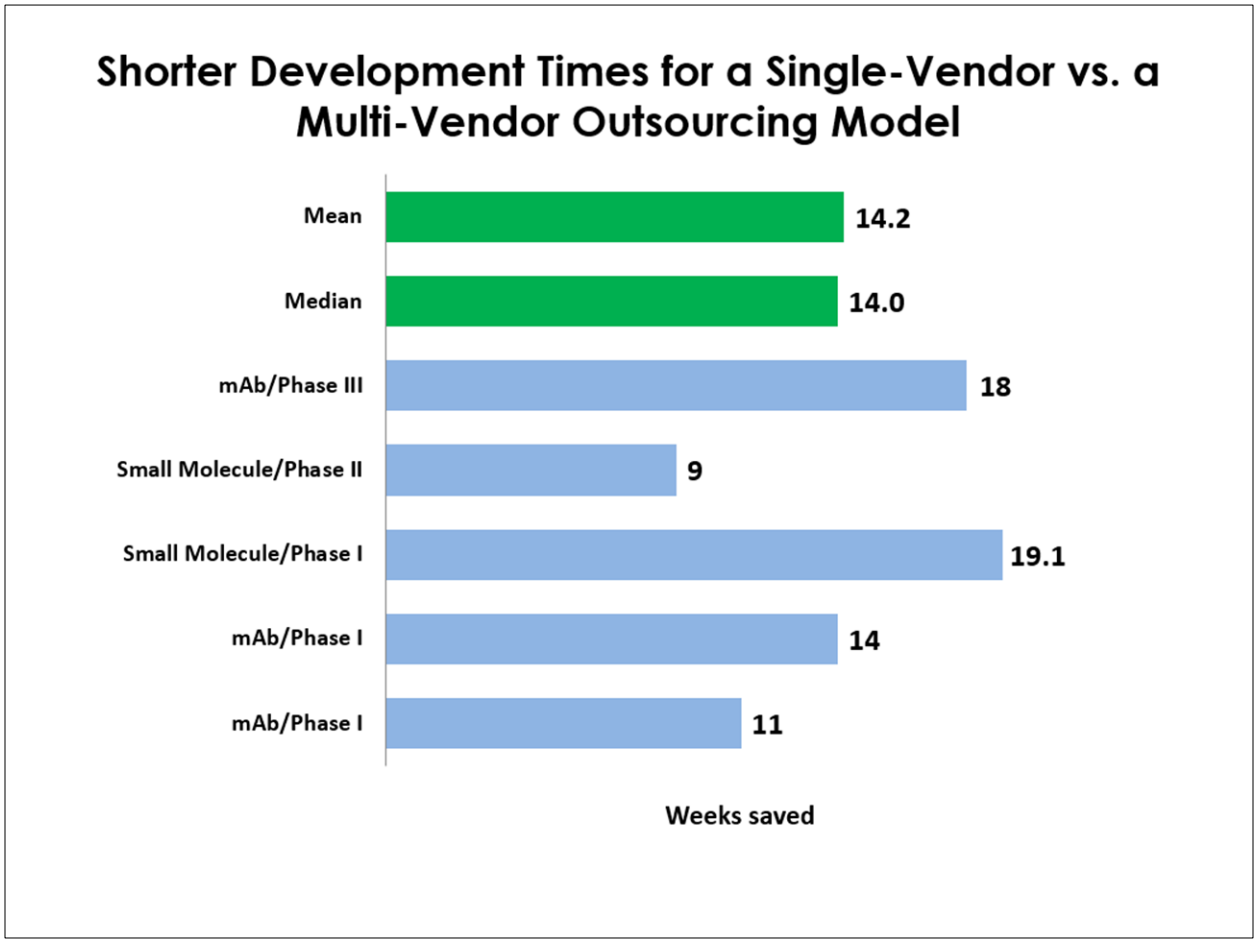
A shorter development process means that net cash flows from an earlier launch can be brought closer to the start of development. Thus, there is a time savings that can be monetized by applying a net present value framework to future net returns from approved new products. We assumed that net cash flows after approval remains the same, but they begin earlier according to the reductions in development phase lengths resulting from a different sourcing model. We used data on the net present value of net returns found in a recent study of the rates of return to new drug development.[2]

The fees charged to sponsors for different contracting models may differ, so we gathered information on what the fees would be for individual manufacturing processes depending on

whether they were incurred under single-source or two-source contracting. The additional costs for single-source contracting can be risk-adjusted by applying industry estimates of the probability of approval by clinical phase. We applied the probabilities of approval by phase from the same study as we used for phase costs and timelines.[1] All costs, returns, and fees are examined on an after-tax basis and are expressed in year 2016 dollars.

FINDINGS

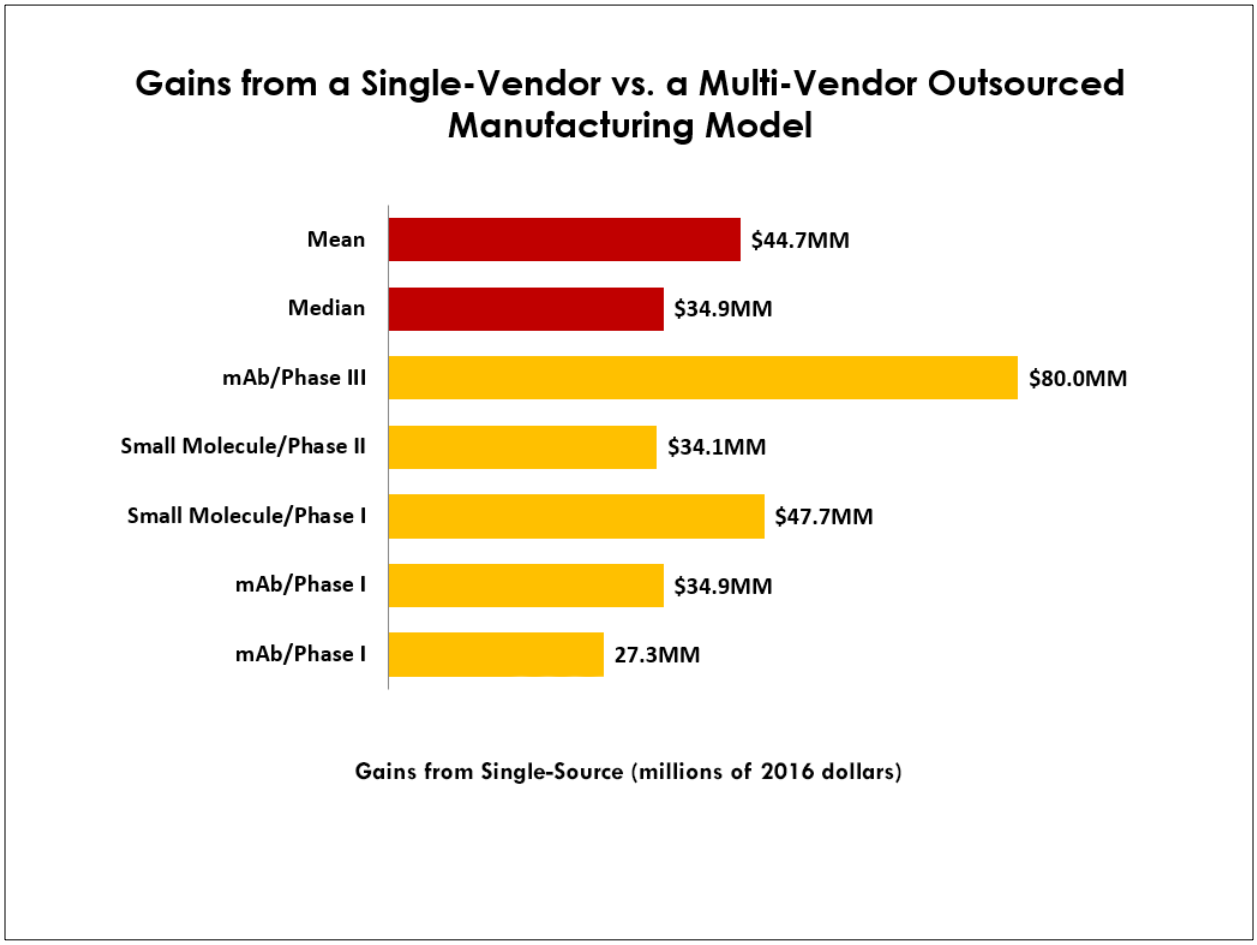
Estimated time reductions from using a single-source versus a multi-source manufacturing outsourcing model ranged from 11 weeks for a mAb in phase I to 19.1 weeks for a small molecule in phase I. The overall mean and median are close at 14.0 and 14.2 weeks, respectively. The mean time reduction for the three mAbs is 14.3 weeks, while the mean time reduction for the two small molecules is 14.1 weeks.



This shortening of the drug development process translates into lower time costs. The results show that sponsors would receive a median pre-tax cost reduction of $21.6 million, and a mean cost reduction of $29.5 million per approval. The median after-tax cost reduction is $15.1 million, while the mean cost savings is $20.6 million per approval.

The results also showed small increases in sponsor fees for single-source versus multi-source contracting. The fee increases ranged from $11,213 to $199,234. The median difference in fees is $146,299, while the mean difference is $112,689. In percentage terms, the increased fees ranged from 1% to 4% of the totals for multi-source contracting. On a risk-adjusted basis (accounting for expenditures on drugs that fail in testing), the median added fee per approval is $356,629, while the mean added fee is $653,504.

If one-source contracting shortens the development cycle, sponsors can expect financial gains from having their products reach the market sooner. We found the after-tax net present value of post-launch net returns to be $962 million in 2016 dollars. With this figure as a base, we calculated increases in the net present value of after-tax net returns from moving from a multi-source contract manufacturing model to a single-source model to range from $15.2 million to $32.6 million depending on the project. The median gain was $23.8 million, and the mean gain was $24.1 million. If we add the reductions in after-tax pre-approval development costs to the increases in post-approval net returns, the total financial gains per project varied from $27.3 million to $80.0 million. We found the median total gain to be $34.9 million, while the mean total gain is $44.7 million.



CONCLUSIONS

This modeling study comparing the financial impact of contract manufacturing approaches found substantial financial benefits to sponsors from employing a single-source, as opposed to a multi-vendor, model of manufacturing outsourcing. The mean after-tax development cost benefit from shorter development times was $20.6 million. The shorter development times also mean that drugs that make it to marketing approval will be on the market sooner. Using results on costs and sales from a recent rate of return analysis, we found that, on average, the after-tax net present value of the earlier launch resulted in a gain of $24.1 million per approved new drug. Cumulating benefits results in an average after-tax gain from single-source contracting of $44.7 million. These gains greatly exceed the additional management fees charged sponsors from one-source contracting (a mean of $0.65 million and a median of $0.25 million per approved new drug).

The number of projects examined here is small and were taken from a single company. Further research expanding on this analysis with respect to the number of projects and firms examined would be useful in confirming these results. Such a study would also allow for comprehensive analyses by subgroups, such as therapeutic category and route of administration. The results here and in any expanded analyses will be driven by the extent to which single-source contracting can compress development times. The results from future studies will also depend on any changes over time in development cost cash flows, development timelines, regulatory approval risks, company costs-of-capital, and the level and pattern of sales from new drugs that do make it to market.

REFERENCES

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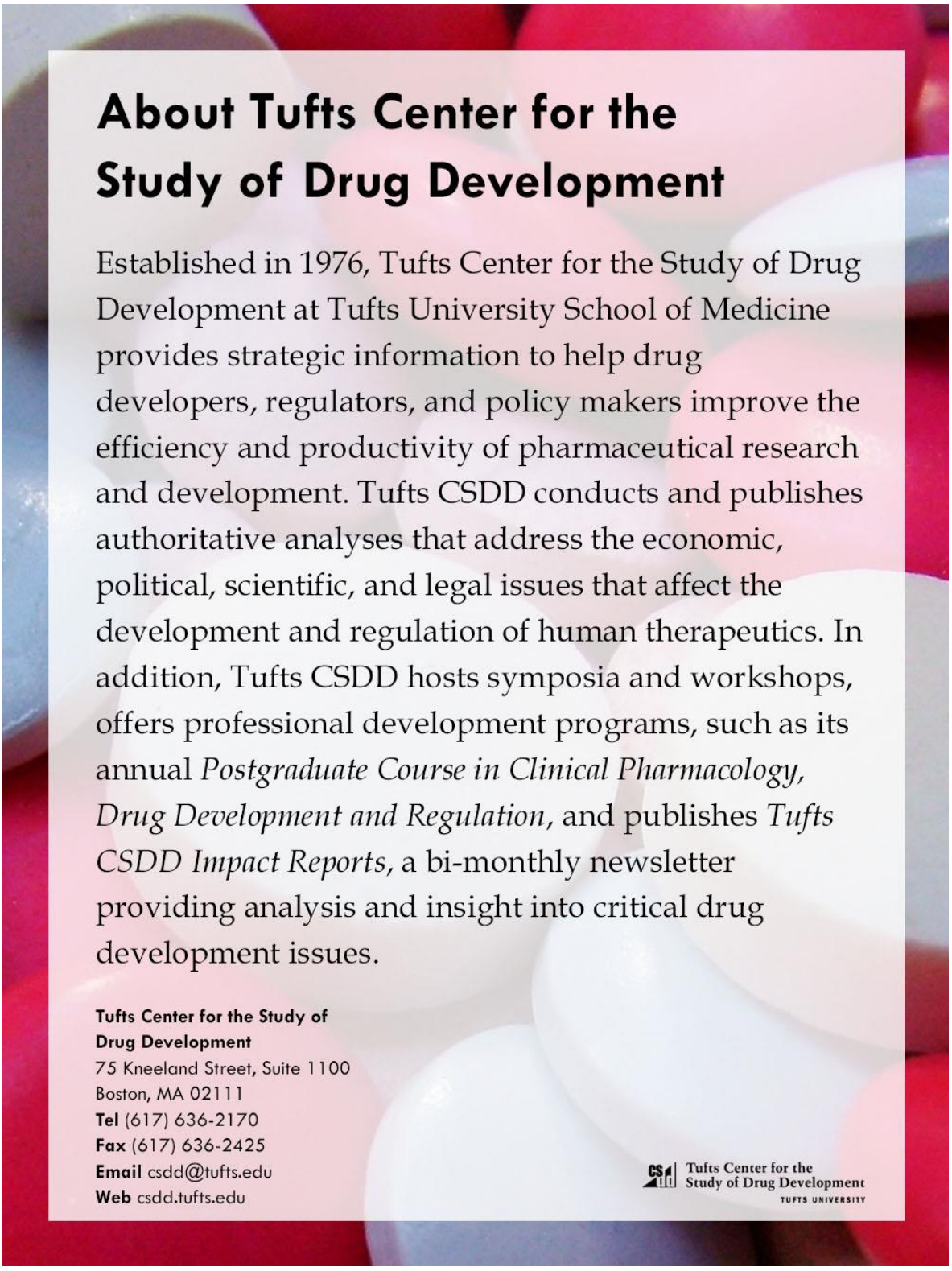

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Established in 1976, Tufts Center for the Study of Drug Development at Tufts University School of Medicine provides strategic information to help drug developers, regulators, and policy makers improve the efficiency and productivity of pharmaceutical research and development. Tufts CSDD conducts and publishes authoritative analyses that address the economic, political, scientific, and legal issues that affect the development and regulation of human therapeutics. In addition, Tufts CSDD hosts symposia and workshops, offers professional development programs, such as its annual *Postgraduate Course in Clinical Pharmacology, Drug Development and Regulation*, and publishes *Tufts CSDD Impact Reports*, a bi-monthly newsletter providing analysis and insight into critical drug development issues.

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