mcube™ by tcgdigital

Total Economic Impact of **mcube™** in BioPharma Industry

The Impact Analysis Report of mcube™ is a study, based on an actual case study, and examines the potential economic impact enterprises may realize by deploying mcube™, the enterprise data & AI platform from TCG Digital, the technology arm of The Chatterjee Group (TCG). It reveals how mcube™ delivers rapid, measurable ROI, leading businesses to successful and sustainable disruption through efficiency gains, improved decision-making, and significant cost savings.

The objective of this report is to provide a framework to evaluate the potential financial impact of mcube™ on enterprises in the bio-pharma sector.

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Introduction

In today's rapidly evolving bio-pharmaceutical sector, the need for AI and advanced analytics solutions has never been more critical. There is a growing need to reduce cost and process timelines in the drug development continuum. A joint research[1] by Carnegie Mellon University and a prominent German institution emphasized that the adoption of AI in drug discovery and development significantly lowers drug development expenses, suggesting potential cost reductions of up to 70%. Furthermore, AI is expected to be involved in 50%[2] of drug launches by 2030 and most bio-pharma companies have started deploying advanced analytics and AI across most of their business units.

mcube™ the advanced analytics and AI platform developed by TCG Digital is the platform of choice in the biopharma industry, as exemplified by its transformative impact on several large to mid sized Biologics companies. mcube™ was developed drawing on the industry-leading knowledge of LabVantage in LIMS, Biomax in semantic modelling & ontologies (now part of TCG Digital) and TCG LifeSciences, a global leader in CRO/CDMO, all part of the TCG Group of companies, to deliver precision targeted solutions for the life sciences sector.

mcube™ is a cGXP-compliant, interoperable, and scalable enterprise data & AI platform purpose-built for life sciences and biopharma manufacturing. It combines advanced data operations with domain-specific ontologies to make enterprise data agent-ready, ensuring context, compliance, and seamless integration across R&D, clinical trials, and manufacturing. With prebuilt agentic applications designed for biopharma use cases—such as yield optimization, stability forecasting, and deviation management—mcube™ accelerates transformation from pilot to scale. The platform supports real-time ingestion of structured, unstructured, and streaming data, with MLOps capabilities enabling rapid and consistent deployment of production-ready models in as little as three months.

To better understand the benefits and costs associated with mcube™, a unit composite biologics enterprise is constructed that is looking at analytics & AI driven transformation across its business units. It is based on the actual case study of a global biologics company, focused on developing and delivering innovative plasma derived therapeutics, and has deployed mcube™ as its enterprise data & AI platform as part of its digital transformation roadmap.

This has led to delivery of rapid, measurable ROI and cost savings resulting from optimized use of raw material, higher production yield, improved compliance and reduction in manual hours, thus improving the composites profitability and market capitalization.

The mcube™ Customer

Composite Enterprise

The composite enterprise represents a global biopharma manufacturer specializing in plasma-derived and biologics therapies. As part of its digital transformation roadmap, the enterprise set out to drive AI-enabled optimization across its business units. Some of its key objectives with implementing mcube™ were:

- **Accelerating** Time-to-Market for its biologics portfolio
- **Optimizing** Production Yields and Managing High Value Inventory Efficiently
- **Improving** Operational Efficiency and Reducing Costs
- **Ensuring** Compliance and Managing Regulatory Risks
- **Integrating** Disparate Data and Enhancing Transparency
- **Scalability and ability** to work with growing complex operational data
- **Ensuring** IT Resilience and Managing Disruptions
- **Effectively** Leveraging Advanced AI Solutions for overall business transformation

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Total Economic Impact Calculation

We have shown direct ROI achieved for this composite through 1) dollars saved due to reduced errors 2) dollars saved due to higher production efficiency and optimized use of raw materials and 3) dollars saved due to improved compliance

The calculations are based on the expected potential cost savings from real-life case studies in bio-pharma where mcube™ is currently deployed.

Savings on Cost of Error (Batch Failure)

A batch failure in plasma pooling is far more costly than an operational error — it represents a multi-million-dollar financial risk and a potential disruption to patient supply. Plasma, the core raw material for life-saving biologics, is one of the most expensive inputs in drug manufacturing, with procurement and handling costs that demand precision at every stage.

In a typical mid-sized biopharma enterprise:

Plasma procurement cost averages $400 per liter, reflecting both the scarcity of donor plasma and the strict quality requirements for therapeutic use.

Batch size is around 5,000 liters of plasma, translating to $2M in raw material cost per batch.

When logistics, storage, and plant operations are factored in (typically adding ~20% to the spend), the fully loaded cost per batch reaches $2.4M.

A single failed batch therefore equates to an immediate $2.4 million loss but the strategic impact is even greater: production schedules are disrupted, supply chain timelines are pushed back, and the delivery of therapies to patients is delayed — creating potential compliance risks and reputational damage.

Annualized Risk:

If even 2–3 batch failures occur in a year, the financial loss alone can exceed $5–7 million, not including downstream penalties, regulatory exposure, or the opportunity cost of lost market supply. This makes batch reliability not just an operational priority, but a strategic imperative for every plasma therapeutics manufacturer.

Therefore, direct cost impact due to one failed batch: $2.4M.

Yield Optimization and Cost Savings

AI-driven yield optimization through mcube™ improves the efficiency with which plasma is converted into usable therapeutic output. By continuously analyzing process data and predicting the most favorable pooling and production parameters, AI enables manufacturers to extract more value from the same plasma input. Even modest efficiency gains can therefore translate into millions in direct annual cost savings. This impact is achieved without increasing procurement volumes or altering supply arrangements, but simply by ensuring that existing plasma resources deliver maximum productive yield.

Here we arrive at the impact of efficiency gains translating into cost savings

Using the same parameters as the previous calculation

- **Total Cost for one batch including overheads (annual plasma spend + overheads): $2.4M**
- **# of batches mfg. in a year for a mid sized pharma: 200**
- **Total cost of batches manufactured in a year (Total cost for one batch*200): $480M**
- **Using Agentic AI improvement in operational efficiency is seen to be between 10-15%**
- **Even if we take a conservative estimate of 7%, that leads to → $33.6M saved annually**

Therefore, cost impact due to Agentic AI optimization: $33.6M saved annually.

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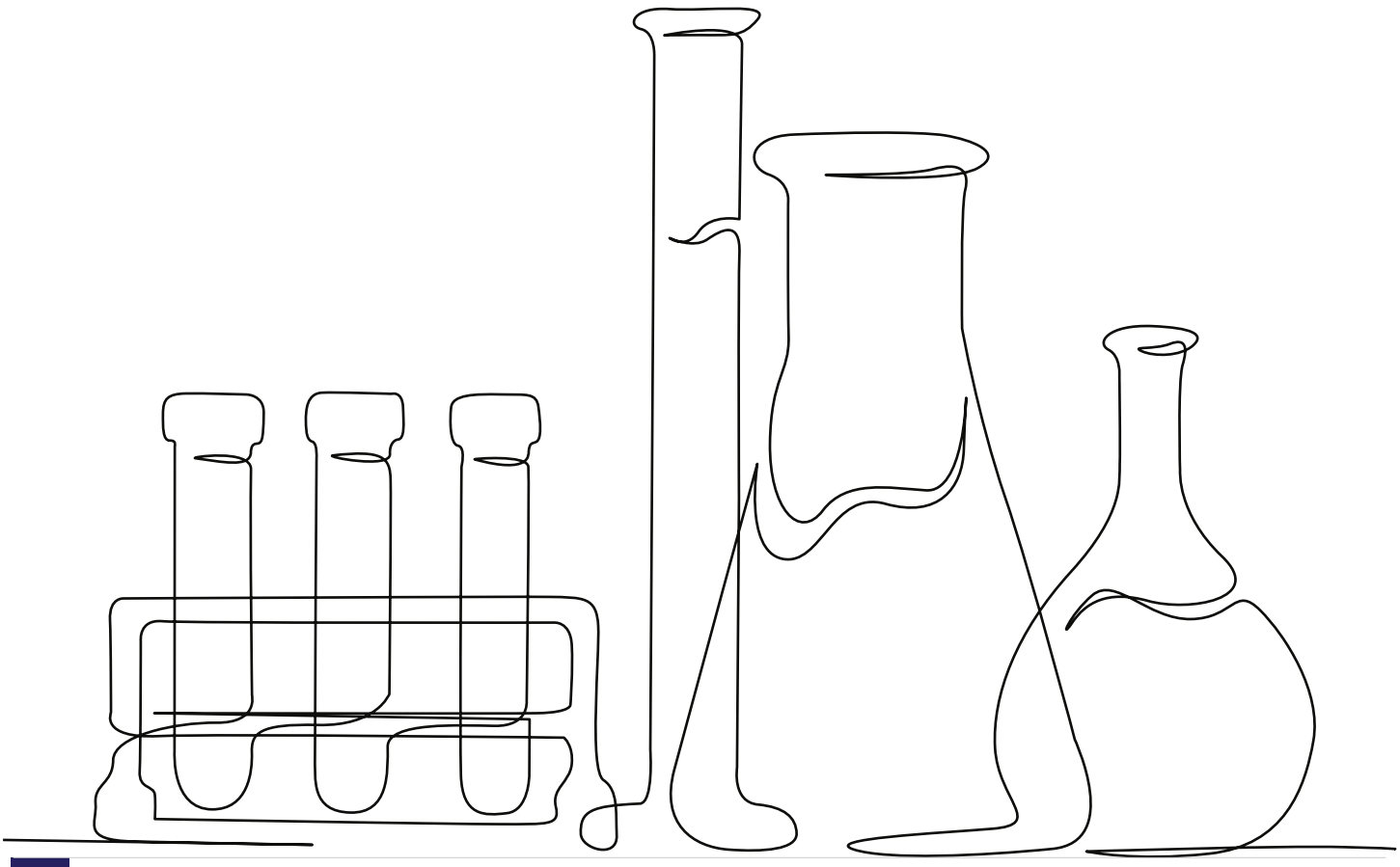
Compliance Risk Avoidance with mcube™

Ensuring compliance with regulatory standards is not optional in biopharma — it is central to patient safety, operational continuity, and financial resilience. Non-compliance due to inconsistent batches, inaccurate documentation, or manual data errors can result in heavy fines, legal fees, and costly remediation activities.

Based on industry benchmarks and published FDA/EMA enforcement cases, penalties for data integrity violations, GMP lapses, or reporting errors often range from several hundred thousand dollars to multiple millions per year. For a mid-sized biopharma enterprise, the average potential exposure can be reasonably estimated at $1M annually, covering fines, legal costs, and the financial impact of halted or delayed production.

By automating documentation and ensuring regulatory-compliant reporting across GMP environments, mcube™ reduces this risk exposure by up to 95%, translating into an estimated $0.95M in avoided annual penalties and operational disruptions. This not only protects the enterprise from financial shocks but also safeguards its ability to deliver therapies reliably to patients.



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Summary of Total Economic Impact from Implementing mcube™

Benefit	Financial Gain
Savings on Cost of Error (considering one batch failure)	$2.4M
Cost savings due to Agentic AI optimization in process	$33.6M
Direct costs saved in aspects of compliance	$0.95M
Total Economic Impact of mcube™ on the composite enterprise	$36.95M Approximately $37 Million

This table below captures the overall transformation and benefits realized by the composite enterprise, beyond just the quantitative benefits, after implementing mcube™.

Benefit	Before mcube™	After Implementing mcube™
Increased user productivity	Siloed data and individual analysis efforts	Significant improvement in productivity for data science, data engineering, business users
Improved decision-making	Limited ability to make data-driven decisions due to democratization issues	Enhanced decision-making capabilities impacting revenue positively, including risk estimation and loss recovery
Faster time to value	Slow time to market	Faster time to market and rapid realization of value for enterprises deploying mcube™
Democratized access to data	Challenges in democratizing data access across the organization	Improved democratization of data access and usage, benefiting both business users and IT
Data Ops	Fragmented data across LIMS, MES, ERP, QC, and other systems with no unified view of operations	Integrated data lake architecture provides a single source of truth, enabling a 360° enterprise-wide view across R&D, manufacturing, and compliance
Prebuilt AI & Agentic Applications	AI adoption limited to pilots; high effort and cost to develop custom solutions from scratch	Library of prebuilt, domain-specific AI and agentic applications accelerates deployment, reduces IT lift, and delivers measurable impact from day one
Enhanced collaboration and knowledge sharing	Limited collaboration and knowledge sharing due to siloed data	Increased levels of collaboration and knowledge sharing across teams and departments
Increased data security and compliance	Data security and compliance challenges, especially when relying on third-party tools	Enhanced data security and compliance through leveraging in-house data with mcube™ functio-nalities
Improved governance	Difficulty in applying governance models and ensuring centralized control and visibility	Centralized control and visibility with improved governance models, ensuring a safe environment for data usage

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Conclusion

The implementation of mcube™ for the composite enterprise has demonstrated substantial financial benefits through optimized raw material usage, error reduction, enhanced compliance and manpower cost savings, proving mcube™ to be a highly effective AI platform in the bio-pharma sector.

References

1 The Role of AI in Drug Discovery and Healthcare

2 Over 50% of drugs to involve AI by 2030, notes report by global pharma professionals' body

3 Plasma pricing derived from https://www.researchgate.net/publication/345390167_The_contested_market_of_plasma

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TCG Digital is the digital & AI arm of The Chatterjee Group (TCG), a multi-billion dollar conglomerate with a diverse portfolio in Aviation, Pharmaceuticals, Biotech, Petrochemicals, and Real Estate across the US, EU, and South Asia. Our umbrella includes companies such as LabVantage, Lummus Technology, and TCG LifeSciences. At TCG Digital, we are driven by our mantra of delivering "Velocity to Value", helping enterprises transform faster and smarter. Our AI Analytics platform tcgmcube is at the heart of these transformations. We enable organizations unlock the full potential of their data, and by seamlessly integrating AI/ML capabilities into their business processes, we empower businesses to accelerate their digital transformation journey, enhancing agility and driving impactful results.

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mcube™ is TCG Digital's flagship Data, AI and Analytics platform. Built with a domain driven design at the cross-roads of industry knowledge and digital prowess, our architecture is designed to handle the most disparate data landscapes with AI 2.0 being at the heart of it combining powerful and advanced models to solve the most complex business problems. The platform integrates mcube.ai and mcube.data, delivering AI capabilities and data management seamlessly through unified platform services.

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