

Using Generative AI to Enhance Government Procurement for Small Businesses
(Technical Topic)

The Effectiveness and Socio-Economic Result of the SBA's Assistance Programs and Their Shortcomings
(STS Topic)

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Introduction

In the vast expanse of the United States' economy, federal contracts hold a position of paramount importance, acting as significant revenue streams for businesses across scales. Small businesses are a significant contributor to the United States' economy. To demonstrate the magnitude, the total number of American workers employed in firms with less than 50 employees is an astonishing 56 million, 17% of the 330 million Americans attributing to the overall population (The White House, 2023). Despite the sheer number of small firms, the historic distribution of contracts granted to small businesses has leaned heavily towards larger, well-established entities, often sidelining small contracting businesses which are just getting started. These trends persist despite the existence of Small Business Administration (SBA) programs, which aim to level the playing field and foster a diverse economic landscape (Dilger & Blackford, 2022).

To comprehend the depth of this problem, one must consider the socio-economic composition of our communities. In the United States, the impact of federal contracting awards ripple through the socio-economic halls of the country, impacting local economies, community development, and the broader public sector. Further, the contracts provided to small firms affect company ownership, and employment for individuals from historically underrepresented and minority populations (Hawkins, Gravier, & Randall, 2018). When a handful of repeat winners continually monopolize these opportunities, the ramifications are vast and deep (U.S. Government Accountability Office, 2019). The economic landscape risks becoming homogenized, stifling innovation, reducing potential cost savings, and depriving communities of broader socio-economic upliftment. In essence, the core objective of SBA programs—to bolster

small businesses in the government market—remains largely unfulfilled (JPMorgan Chase & Co. 2022).

However, in the digital age where technology continually reshapes industries, there emerges an opportunity to avoid the seemingly inevitable socio-economic pitfalls of America's federal contracting ecosystem. Advanced technology platforms, fortified with tools like data analytics, algorithmic and AI-driven insights, and generative AI assistants present an avenue through which the dynamics of federal contract distributions can be rebalanced. The pertinent questions then arise: What specific elements within the Small Business Administration's (SBA) assistance programs' design, particularly in their incentive structures and technology infrastructure, contribute to their perceived ineffectiveness, and what were the underlying assumptions and decision-making processes of the system's designers? And what socio-economic shifts does technological adoption usher in?

In this portfolio, a dual-faceted approach seeks to address these pressing questions. On the technical front, I aspire to dissect the role of cutting-edge platforms in the bidding processes of federal contracts. My goal is to conceptualize and propose a platform tailored specifically for small contracting businesses, aiming to equip them with the resources and insights required to compete effectively, with emphasis on optimizing the limited resources the firms hold.

Concurrently, my STS research dives deep into the societal implications. I aim to understand the wide-ranging social and economic impacts of the current trends in distributing federal contracts, and how adopting technology might change this situation. Additionally, I wish to identify the disadvantages of the current system. Through a mix of qualitative and quantitative research methods, from in-depth case studies to comprehensive data analysis, I hope to shed light on this pivotal junction of technology and socioeconomics.

Technical Topic

Despite today's technologically rooted landscape, the platforms available for bidding on federal contracts largely focus on listing available opportunities, with some rudimentary filtering and search capabilities. Top platforms for federal contract searching exists on a singular platform, SAM.gov (Dilger & Blackford, 2022). The current technology powering SAM.gov does little to decipher the complexities of the bidding process or to provide insights and guidance tailored to the unique challenges faced by small businesses. Granted the platform has made the contract visibility process more transparent and standardized, it often lacks the advanced features required to make the bidding process intuitive and competitive. In turn, the more stringent processes for certifications and vetting contracts have turned into a barrier for newer and disadvantaged contracting firms (Edelman & Azemati, 2017).

To address the shortcomings of current state of federal contracting, I introduce '*Procuremint*', an advanced web-based platform designed to level the playing field for small contracting businesses. This platform amalgamates the power of data analytics, AI-driven insights, and a user-centric interface. It offers features like dynamic bidding assistance, in-depth contract analytics, real-time updates on regulations and requisites, and subcontracting forums.

The proposed solution, *Procuremint*, is not merely a slight progression in federal contracting, but a great evolutionary step in how small contracting businesses approach federal contracts. The dynamic bidding assistance leverages Natural Language Processing (NLP) focused AI to offer real-time guidance during the bidding process, ensuring businesses don't miss out on crucial criterion embedded in thousands of characters in solicitations that could enhance their chances of success. The contract analytics dashboard demystifies trends and growth sectors,

empowering businesses with strategic insights. Moreover, with a dedicated feed for real-time updates and subcontracting forums, businesses are always informed, adaptable, and collaborative.

The introduction of this paper highlighted the significant socio-economic implications of the monopolization of federal contracts by a handful of larger entities. *Procuremint* directly addresses this by equipping small contracting businesses with the tools and insights they need to effectively compete. By making the bidding process more intuitive and informed, I hope to see a more diverse range of businesses securing federal contracts, thereby fostering economic diversity, driving innovation, and amplifying the broader socio-economic benefits that come from a varied and vibrant business ecosystem.

Recognizing the daunting challenge small businesses, especially newcomers, face in terms of the time and financial constraints during bid submissions, *Procuremint* is constructed to alleviate these very pain points which prevent successful bids (JPMorgan Chase & Co. 2022).

The primary feature set is as follows:

- *Dynamic Solicitation Authoring*: Leveraging GenAI base LLM models, this feature offers real-time guidance and content generation during the bidding process, extrapolating from a vast dataset of past bids to optimize chances of success and utilizing custom company information.
- *Contract Requirement Manager*: Provides an intuitive visualization of fulfilled Scope of Work requirements and current contract trends, allowing businesses to make informed decisions.
- *Personalized Contract Recommendations*: Tailored to a business's profile and past experiences, ensuring they never miss a fitting opportunity.

- *Regulation Update Center*: Keeps businesses updated with the latest regulatory changes, ensuring they're always in compliance, integrating with several SBE programs (HubZone, 8(a), and state programs).

In summary, *Procuremint* is a testament to the belief that with the right technological tools, society can build an equitable economic landscape where businesses of all sizes have an equal shot at success, not just the businesses who hardly fit into the designation of small business (U.S. Government Accountability Office, 2019). The use of software to empower small businesses by granting access to resources that were unavailable before aims to even the playing field with larger competitors with ample resources to spare. By reshaping the way small contracting businesses approach federal contracts, we hope to set in motion a wave of positive socio-economic changes.

STS Topic

The Small Business Administration's (SBA) assistance programs are designed with the core objective of supporting and empowering small businesses (U.S. Government Accountability Office, 2019). While the assistance programs promise to provide avenues for growth, networking, funding, and more, there are copious complex sociotechnical aspects woven into them and their existence can pose negative side-effects. The side-effects include the technology interfaces they employ, the training they provide, and the very structure of the programs, all of which can inadvertently serve to advantage or disadvantage certain groups. Understanding the true effectiveness of these programs necessitates examining not just their overt impact, but also how they navigate these sociotechnical waters and potentially propagate unseen disparities.

To address potential social-economic issues, the Government audits the performance of the SBA's operations; for example, the Government Accountability Office (GAO) was charged to conduct a quantitative report on the SBA's impacts, specifically the impact of small businesses receiving contracts then growing to a mid-size level. Despite oversight by independent and government-sponsored organizations, there remains a notable gap between how agencies' performances are portrayed through metrics and their actual impact. The SBA, for example, announced a significant increase in federal spending on small businesses, presenting it as a major achievement for the country (U.S. Small Business Administration, 2021). Beyond just the total federal expenditure, the SBA issues Small Business Federal Procurement Scorecards to assess and showcase government agencies' effectiveness in aiding small businesses. While these key metrics and scorecards are generally suggestive with positive outcomes, a more detailed and critical examination reveals that the data might not accurately represent the real extent of support these agencies provide to small businesses.

As such, discrepancies exist between the public's opinion on the effectiveness of the programs and the numbers published by the United States government. Steven J. Koprince, a recognized expert in federal government contracting and founder of Koprince McCall Pottroff LLC, has made significant contributions to the understanding of government contracting dynamics, and furthered by his authorship of relevant publications and a history of authoritative speaking engagements. His expertise is grounded in his extensive experience with GAO bid protests, SBA eligibility challenges, and the provision of comprehensive legal services to government contractors. An article, released by Koprince McCall Pottroff LLC, highlights findings from a Senate Committee report showing a 32% decline in prime awards, a contract directly with the federal government, to small businesses between 2009 and 2018 (Koprince

2021). Koprince's analysis reveals that despite this substantial decrease in awards to small businesses, agencies faced minimal penalties due to the weighting structure of the Small Business Federal Procurement Scorecards. In the federal contracting system, an agency may only incur a maximum penalty of '0.7' points in their evaluation scorecard, even if they lose 100% of their small business vendors, highlighting a potential exploit in the accountability mechanisms (Koprince, 2021). Likewise, the scorecard is heavily weighted for total dollars spent, not the number of small business vendors which receive these dollars. This creates an environment where agencies who are supposed to support small businesses are not only rewarded for spending indiscriminately, but also face no documented penalty for leaving the SBA mission statement unfulfilled.

I am exploring the following question: What elements within the SBA assistance programs' design, particularly in their incentive structures and technology infrastructure, contribute to their perceived ineffectiveness, and what were the underlying assumptions and decision-making processes of the system's designers?

Established in 1953, the SBA has since launched multiple assistance programs aimed at bolstering small businesses. Over the decades, the technological framework supporting these programs has evolved, from rudimentary paper-based processes to sophisticated digital platforms. Each technological shift, however subtle, brings with it assumptions about users, altering the very dynamics of who benefits from these programs and how. In reassessing the SBA assistance programs through the lens of Science and Technology Studies, particularly focusing on the co-production framework furthered by Sheila Jasanoff, this inquiry delves into the intricacies of the program's design and implementation (Sismondo, 2010). This analysis aims to critically examine the specific elements within these programs, particularly their incentive

structures and technological infrastructure, to understand their contributions to the perceived ineffectiveness.

Methods

The investigation of the SBA's practices to answer the above research question will be conducted with primary focuses on:

- **Quantitative Assessment:** Analysis of data on businesses that have availed SBA's assistance programs, tracking their growth, success rates, and any correlation with specific program facets.
- **Surveys and Interviews:** Engaging directly with beneficiaries of these programs, capturing feedback, stories, and experiences, especially relating to any technological challenges or benefits.
- **Technology Evaluation:** Reviewing the digital platforms and tools employed by the SBA, assessing for usability, accessibility, and potential biases.
- **Stakeholder Engagement:** Conversations with SBA officials, program designers, and tech developers to glean insights into program design intentions and perceived outcomes.
- **Comparative Analysis:** Comparing the SBA's initiatives with similar programs in other countries or contexts to identify different approaches and their effectiveness.

The co-production framework, as popularized by Jasanoff and her research, refers to the idea that science, technology, and society are mutually constituted, shaping and influencing each other (Jasanoff, 2004). In this context, co-production is employed to understand the relationship between technological infrastructure and the socio-economic objectives of the SBA and its underlying programs. It helps in understanding how the technological design was anticipated to align with the social goals of supporting small businesses and where these goals may have

become blurred in the SBA's implementation processes. The design of technology platforms used in SBA programs often reflects assumptions about the users' technological proficiency, needs, and business operations. For instance, platforms like SAM.gov intend to streamline the contract bidding process but may not adequately address the specific challenges faced by small businesses, particularly those new to federal contracting or with limited resources. It is the aim of my proposed research to discover where the shortcomings of the programs stem, with exploratory investigation to be conducted applying the co-production framework to unpack and understand the technological designs of SBA platforms and their respective social goals, underlying assumptions in the embedded technological designs and implementations, programs incentive structures and impact, and socio-economic implications to attempt to reach a conclusion on policy recommendations.

In seeking to answer the research question, this STS study will endeavor to unravel the nuanced network of interactions, technologies, and outcomes that define the SBA's assistance programs, ultimately striving to chart a path toward more equitable and impactful future iterations.

Conclusion

The SBA's assistance programs serve as a pivotal tool in aiding small businesses, which are frequently regarded as the backbone of the American economy. However, as with any complex sociotechnical system, the existence of a program does not guarantee its efficacy. Grounded in the co-production framework, I anticipate my analysis provides a deeper understanding of the specific design elements and decision-making processes behind the SBA's assistance programs. It underscores the importance of aligning technological design and

incentive structures with the socio-economic objectives of supporting small businesses. The findings from this analysis are crucial for informing future policy decisions and programmatic adjustments, ensuring that the SBA's programs not only exist in theory but also function effectively in practice, fostering a robust and diverse small business ecosystem. While there have been significant achievements attributed to the SBA's interventions, as evidenced by some of the data, concerns remain, especially when discrepancies in reporting and the actual experiences of businesses come to light. The weighting structure of the Small Business Federal Procurement Scorecards, for instance, highlights the potential pitfalls of over-reliance on quantitative metrics without considering the qualitative experiences of the very businesses they aim to support. This is especially true when the realized qualitative experiences of the small business rival that of medium entities (Hawkins, Gravier, & Randall, 2018).

Integrating insights from the technical section, this prospectus acknowledges the potential of digital platforms like *Procuremint* in transforming federal contract bidding. This advanced platform embodies the intersection of technology and policy, aiming to level the playing field for small contracting businesses through features like dynamic bidding assistance and contract analytics. By empowering these businesses with tools and insights needed to compete effectively, *Procuremint* could potentially address the shortcomings of current federal contracting processes and contribute to a more diverse, innovative, and socio-economically beneficial business ecosystem.

For the SBA's assistance programs to truly fulfill their promise, it's crucial to adopt a holistic perspective that goes beyond mere numbers. It's about understanding the intricate web of relationships and dependencies and ensuring that technology serves as a unifying enabler rather than a barrier. As we move forward, continuous evaluations, such as the one proposed in this

study, are essential not just for accountability, but to ensure that the spirit and objectives of these programs are met in practice, ensuring a more robust, inclusive, and thriving small business ecosystem for all.

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