

Analysis Plan

Project Name: Increasing applications for contracting assistance among underserved small businesses through proactive outreach

Project Code: 2403

Date Finalized: 6/25/2024



Project description

Agency and program description

The U.S. Small Business Administration's (SBA) 8(a) Business Development Program (8(a) program) is a 9-year business development program that allows for one-time participation for firms and individuals, except for entity-owned firms, and provides program participants with training and technical assistance to enhance their ability to compete in competitive business environments.¹ The government limits competition for certain contracts to businesses participating in the 8(a) program. One program benefit is that 8(a) firms may receive federal contracting through set-aside and sole-source awards. As a business development program the overall goal is for 8(a) firms to complete their nine-year program term and continue to do well in a competitive marketplace.²

Intervention and evaluation design

Some high percentage (around 70%) of applications to the 8(a) program are submitted incomplete, which delays approval and thereby access to the important benefits this program provides. Many others initiate an application and then never submit. An important question for the 8(a) program team is therefore how to increase the number of complete application submissions. In this project, OES worked with the 8(a) program team to design and evaluate a novel email outreach intervention among potential applicants who have initiated but not yet submitted their applications to the 8(a) program, and therefore may still be able to improve the quality of their applications before submission.

We test two email outreach strategies:

- **“Local resource email”:** This email provides contact information for local resources (APEX Accelerators) who provide help with the application process. Importantly, meeting with a resource partner also advances applications ahead of other applications going through the prescreening step (see Figure 1 below).

¹ Entity-owned firms face a different set of rules but apply through the same system. Because we will not know that they are entity-owned at the time of submission, they will be included in our analysis as well, even though we anticipate less of a response to this intervention.

² A set-aside contract limits competition for the award to a specific group of businesses.

- **“Checklist email”**: This email includes clear checklists of action items that potential applicants need to complete to have a successful and fast processing time and points out the most common causes of application incompleteness and rejection.

The study uses a two-by-two factorial design, with “no email” as the business-as-usual condition. Thus, one quarter of the sample receives no email, one quarter receives the local resource email, one quarter receives the checklist email, and one quarter receives an email containing both the checklists and the information about the local resource. Emails are sent in four batches, April 15, April 29, May 13, and May 29. Each email batch includes all firms that initiated but did not submit in the two weeks prior. The final two rounds also each include emails to half of all firms that initiated at any point before April 1, 2024 and had not yet submitted (i.e., the application backlog). We plan to measure the impact of this outreach on the short-term outcomes of application submission and completeness (within 4 to 14 weeks of initiation), as well as on the long-term outcome of application approval and other application-related outcomes (within about 1 year of initiation).

8(a) program application process

Figure 1. 8(a) Program application timeline

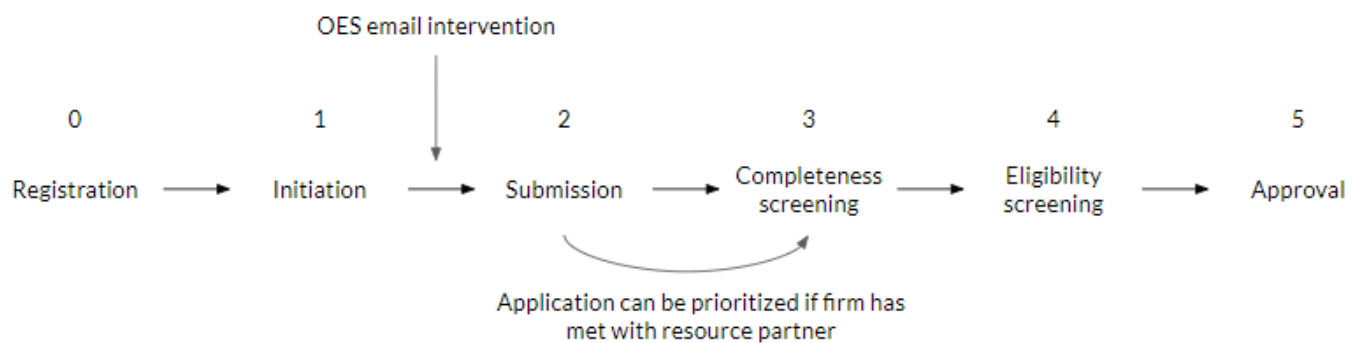


Figure 1 shows the timeline of 8(a) program applications. As noted above, eligibility for the 8(a) program requires that the firm is registered with the federal government as a contractor and meets several qualifying criteria (step 0).³ To be approved and certified to participate in the 8(a) program, applications must pass through each step depicted above. First, a firm initiates an application on an online portal, which requires providing contact information and a Unique Entity Identifier (UEI). Next, a firm submits an application with supporting documentation. Then, applications and supporting documentation are pre-screened for completeness. This process is carried out by the SBA government analysts and a third-party contractor who review applications for completeness, sometimes returning them to applicants with requests to provide missing information or supporting documentation. Importantly for this study, if the applicant answers “Yes” to the application question, “Have you met with a Resource Partner to assist with your 8(a)

³ The firm must: Be a small business; Not have previously participated in the 8(a) program; Be at least 51% owned and controlled by U.S. citizens who are socially and economically disadvantaged; Have a personal net worth of \$850 thousand or less, adjusted gross income of \$400 thousand or less, and assets totaling \$6.5 million or less; Demonstrate good character; Demonstrate the potential for success such as having been in business for two years.

application,” and provides evidence of coordination, the SBA may prioritize the review during pre-screening. Once the analyst determines the application is complete, it is then moved to processing, where the SBA analysts review to affirmatively determine if the applicant meets required elements of eligibility. Again, this process may involve program analysts returning an application to a firm with requests for clarification or additional information. Finally, an application is recommended for approval and certification. Once certified, the firm is a program participant and begins the 9-year business development program with access to management and technical assistance training and instantaneous access to sole source and competitive federal contracts.

As indicated in Figure 1, this project involves sending emails to firms who have already initiated but not yet submitted applications. To the best of our knowledge, this is the first time such outreach has been tested: businesses who have initiated but not submitted applications are not typically contacted by a program analyst.

Preregistration details

This Analysis Plan will be posted on the OES website at oes.gsa.gov before outcome data are obtained from the 8(a) team and analyzed.

Hypotheses

We are interested in the effects of the local resource and checklist emails on the application outcomes of firms who are registered with SAM.gov and have initiated an application for the 8(a) program. Two shorter-term outcomes — application submission and completeness — and one longer-term outcome — application approval — are of particular interest.

Our hypotheses that pertain to the outcomes we plan to include in the first study are as follows:

H1: We hypothesize that the local resource email encouraging applicants to meet with APEX Accelerators and providing APEX Accelerator contact information will increase the likelihood that a firm submits an application, and that the application is screened as complete, by July 1, 2024.

H2: We hypothesize that the checklist email providing applicants with a checklist of action items will increase their likelihood that a firm submits an application, and that the application is screened as complete, by July 1, 2024.

We do not include a hypothesis for an interaction, though we include an interaction analysis in the exploratory analyses below. When designing the randomization for this study, we initially expected the interaction effect to be negligibly small and thus planned on excluding it from the analysis. The factorial randomization was designed primarily to increase our statistical power. However, after further internal discussion and reflection we came to the conclusion that a negative interaction is plausible.⁴ Our statistical analyses reflect this updated understanding.

⁴ The assumption that there is zero interaction requires the effects of the two factors to be perfectly additive: if each factor increases submission by 5 pp then the group who receives both (group 3) would have a 10pp higher submission rate than the group that received no emails (group 4). However, we consider it plausible that the content simply receiving any email at all may matter. In this case, the submission rates for groups 1-3 would be similar, which is equivalent to a negative interaction between the factors.

Importantly, we expect the emails to have different effects on these three outcomes due to differences in program eligibility among the businesses who have initiated an 8(a) application. Specifically, we expect that there is some subset of business-owners whose firms are eligible for the 8(a) program and who will therefore be encouraged to submit more complete applications in a more timely manner by the emails. We expect the effect of the emails to be positive for this group: if the intervention works, their submission, completeness, and approval outcomes will all improve as a result of the emails.

We also expect that there exists some subset of firms who are not eligible for the 8(a) program but did not realize this before initiating an application. Conceivably, either one of the emails could lead a business-owner to realize their firm is ineligible and deter them from submitting an application when they otherwise would have. Going through the checklist may help business-owners understand their ineligibility better, for example. But we think this deterrent effect is particularly likely for the local resource email, which might result in a firm meeting with an APEX accelerator and doing more intensive application preparation and pre-submission review. From the perspective of saving time for both business-owners and program analysts, deterring ineligible initiators from submitting is a positive outcome.

However, we do not anticipate being able to identify, from the initiation data alone, which firms would be determined by the SBA to be eligible for the 8(a) program. For the submission outcome, this means we may be averaging over two groups in the sample, one experiencing positive and the other negative effects on submission. The deterrent effect on submission by ineligible initiators may therefore lead us to underestimate the positive submission effect for eligible initiators.

In principle, this same issue should apply to application completeness, because eligibility is not screened until after completeness is screened. This implies that some ineligible applications may make it through the completeness phase (step 3 in Figure 1) only to be rejected for ineligibility at the next phase (step 4). Thus, business-owners who initiate complete but ineligible applications may be deterred from submitting an application when they receive the emails but not when they are in the no-email group, leading to a negative effect on application completeness for that group.

In practice, however, we expect that the deterrent effects on completeness will be smaller than those on submission, and that is because we expect incompleteness and ineligibility to be highly correlated. Anecdotally, our interactions with program staff suggest that many incomplete submissions are incomplete because of their ineligibility: for example, an application may not have the documents to prove two years of revenue because the applicant has not had two years of revenue and is therefore ineligible.

By the time firms make it to the approval phase, they have been screened for eligibility. Thus, we do not expect to see any deterrence effects at this stage. In other words, we do not expect that a firm who would have been approved if they submitted will be deterred from submitting. This outcome is described below as a long-term primary outcome, because it takes many months for a firm to reach this phase. As such, we do not plan to include this outcome in the main published report on this study, which will rely on data collected up until July 1, 2024. We may include this outcome in a longer-term follow-up study.

Data and data structure

This section describes variables that will be analyzed, as well as changes that will be made to the raw data with respect to data structure and variables.

Randomization:

There are four randomly assigned groups in this study:

1. Local resource email
2. Checklist email
3. Combined local resource and checklist email
4. Business-as-usual: the application receives no email

The randomization sorted applications by the initiation date. Each consecutive quadruplet of applications was assigned with equal probabilities to one of the four conditions. Thus, the emails are block-randomized by initiation date quadruplets.

Data source(s):

There are two main sources of data: data on applications to the 8(a) program from Certify.gov and data on businesses from SAM.gov.

Certify.gov is the online portal businesses use to initiate and submit applications to the 8(a) program. We will use this data initially to define the sample and randomly assign the intervention, and then later to measure outcomes. We will obtain data for all firms that have initiated applications, including whether and when the application was submitted, the completion of specific questions in the application, and the timing of moving through the certification process. This will cover all firms that either initiate an application during the study period or have previously initiated an application that the 8(a) program considers to be open. The initiation dates for these firms go back as far as November 2017. Outcome data (submission timing and application information) will be obtained after this Analysis Plan is publicly posted. We will not receive information on submitted applications for any firms after they have been included in the study (whether or not they were sent an email) until this document is posted to avoid having outcome data.⁵

SAM.gov is the central source of data on federal procurement and contains information on all businesses registered to do business with federal entities. Using a SAM identifier, we are able to link the data on registered businesses to their initiated 8(a) program application. This will provide the following variables, used as control variables to make our estimation more precise and, if the

⁵ Throughout the study, we have received some limited information on submissions in order to remove firms that submitted applications before they would have been contacted. To avoid accessing outcome data, we only obtained information about submission *before outreach*. This meant that we never had information on any submissions that occurred after a firm was assigned to treatment or contacted.

statistical power is sufficient, to estimate heterogeneous effects: the distance from the firm to the closest APEX Accelerator and previous federal contracting certifications.

Outcomes to be analyzed:

The primary outcomes of interest will be:

- Whether the applicant submitted their application by July 1, 2024
 - This will be a binary variable coded as 1 if an application was submitted and 0 if an application was not submitted.
- Whether the applicant submitted an application that was screened as complete by July 1, 2024
 - This will be a binary variable coded as 1 if an application was screened as complete and 0 if it was not submitted, is still in the screening phase, or was returned because incomplete.

The secondary outcome will be:

- Whether the applicant included documentation of having met with a resource partner in a submitted application by July 1, 2024.
 - This will be a binary variable coded as 1 if an application includes documentation of meeting with any resource partner and 0 if either the application does not include this documentation or the application was not submitted by July 1, 2024.

Imported variables:

We plan to merge three datasets. We will start with the randomization dataset, which will contain the applicants' email address, business name, date of initiated application, zip code, randomization block, UEI (Unique Entity ID), and treatment assignment. We will merge this with data from Certify.gov, provided by the 8(a) team, which contains data from submitted applications, including when the application was submitted, whether the application was screened as complete, and whether a submitted application provided documentation of having met with a resource partner. We will finally merge this with data from SAM.gov, which contains background information about each firm including its location and other variables that we can use as covariates.

Transformations of variables:

From the raw data above, we will construct the following variables:

1. application_submitted: A binary variable indicating whether the application was submitted
2. application_screened_complete: A binary variable indicating whether the submitted application was screened as complete and has moved into the eligibility screening phase
3. met_with_resource_partner: A binary variable indicating whether an applicant reported in their application that they had met with a resource partner, which requires uploading documentation (0 if indicated had not met with resource partner or not submitted)

Data exclusion:

We will include firms that initiated an application before and during the study period. We will exclude firms with multiple initiated applications with the same UEI or email address. This will be done after receiving outcome data as a small number of firms will initiate in different two-week periods. We will also exclude firms that submitted an application before we would have emailed them. In the event that an applicant submits in the short window between randomization and sending the emails, we will include them in the study.

Treatment of missing data:

We do not anticipate any missing data for our primary outcomes. The sample includes all firms that initiate, and if they do not continue the process, this is itself an outcome, with submitted and screened as complete coded as zero.

Statistical models and hypothesis tests

This section describes the statistical models and hypothesis tests that will make up the analysis – including any follow-ups on effects in the main statistical model and any exploratory analyses that can be anticipated prior to analysis.

Statistical models:

As noted above, we have a two-by-two factorial design, where one factor involves receiving a checklist and the other involves receiving a connection to a local resource. The combination of these factors creates the four groups described [above](#).

The first main specification will be a linear regression of the outcome on binary indicators for each factor and their interaction, with fixed effects for blocks.⁶ Thus we will estimate, for the full sample:

$$Y_{ij} = \alpha_0 + \beta_1 * 1[Checklist_{ij}] + \beta_2 * 1[ResourcePartner_{ij}] + \beta_3 * 1[Checklist_{ij}] * 1[ResourcePartner_{it}] + \gamma_j + \varepsilon_{ij}$$

where Y_{ij} is a binary outcome variable for firm i in randomization block j , $1[Checklist_{ij}]$ is a binary indicator for being in a group that received a checklist (including both those that also did and also did not receive the local resource encouragement), $1[ResourcePartner_{ij}]$ is a binary indicator for being in a group that received a local resource encouragement (including both those that also did and also did not receive a checklist). We include block fixed effects (γ_j), and ε_{ij} is an error term. The coefficients β_1 and β_2 are the coefficients of interest, estimating the main effect of each factor alone relative to the business-as-usual group. We leave interpretation of the coefficient on the interaction term to the exploratory analysis, as we anticipate that it is likely to be under-powered. We also do not include the interaction term in our multiple hypothesis testing. See [above](#) for an explanation.

⁶ Randomization is blocked by groups of four in order of initiation date, as described above.

The second main specification will compare outcomes for those who received any email with those who received nothing. Thus we will estimate the following equation for the full sample:

$$Y_{ij} = \alpha_1 + \beta_4 * 1[AnyEmail_{ij}] + \delta_j + \xi_{ij}$$

where $1[AnyEmail_{ij}]$ is a binary indicator for whether any email was sent (equal to 1 for those in groups 1, 2, and 3, and 0 for group 4, as defined [above](#)). Then β_4 estimates the effect of receipt of any of the email outreach relative to not receiving an email.⁷

We will estimate coefficient standard errors and confidence intervals using a [heteroskedasticity-consistent, HC2, estimator](#). We plan to use the `lm_robust` function from the `estimatr` package for R. Our hypothesis-testing procedure is described below.

Confirmatory analyses:

We will estimate two effect sizes for each of the two primary outcomes using the linear regression estimator described above to target the following estimands:

- The effect of each treatment on an indicator for whether an application was submitted by July 1, 2024
- The effect of each treatment on an indicator for whether an application was submitted and then screened as complete by July 1, 2024.

Exploratory analysis:

Exploratory analysis will take three primary forms. The first is to look for differential treatment effects by subgroups. Some of this analysis can facilitate understanding underlying mechanisms and other analysis can help guide future decisions about scale-up if the information provided is determined to be sufficiently beneficial. The second set of exploratory analyses involve estimating the combined effect of the two treatments compared with either one independently, and the effect of any treatment compared with no treatment. This analysis can inform details of any future implementation. The third set of exploratory analysis included in this document outlines analysis that could be undertaken after more time has passed, allowing more firms to submit applications, more of those applications to be reviewed, and even for some of those firms to have obtained federal contracts.

Differential treatment effects

We will analyze heterogeneity in the intervention's effects based on the variables described below. We will do this by interacting the variables below with indicators for each of the emails and including the same outcomes as described in the primary analysis:

- Distance between firm and its closest APEX Accelerator

⁷ The estimand is defined as an average of three average treatment effects defined with respect to the four groups: the effect of receiving the local resource email (being in group 1) versus no email (group 4); the effect of receiving the checklist email (being in group 2) versus no email (group 4); and the effect of receiving the combined local resource and checklist email (being in group 3) versus no email (group 4). β_4 estimates the equally-weighted average of those three effects.

- If an email encouraging meeting with an APEX Accelerator especially helps firms located near APEX Accelerators, then this suggests that such outreach may be more helpful for some than for others.
- For meaningful interpretation, we will use indicators for being within the same city, and within a reasonable distance (5, 10, 25, 50 miles) as used in the 8(a) program's existing link to local resources.⁸
- Time between initiation and inclusion in the evaluation
 - Among the firms who initiated up to two weeks before emails were sent, we can compare the effects of the emails on those who received outreach sooner (in the first week following initiation) or in the second week following initiation. If the effect of the email is larger for those emailed more quickly, this suggests that quicker outreach could be valuable. Then perhaps an automated system to immediately send information could be more useful than a manual system involving emailing applicants in batches.
 - We can also compare the effects of the emails for all of those reached within one month (or one year) of initiating and those reached after more than one month (or one year). Some firms that initiated years ago may no longer be operating or interested in 8(a) certification. Thus, the true effect for those recently initiated firms could be larger than the effect estimated for the full sample.
- We can also look at effect heterogeneity by characteristics of firms included in SAM.gov. To initiate an 8(a) program application, a firm needs a UEI, allowing us to link all initiated firms with their SAM.gov profiles. This includes:
 - **Location:** This allows us to look at differential effects by location characteristics, including proximity to other 8(a) certified firms, federal contracting opportunities, demographic differences of zip codes, and urban and rural differences.
 - **Other pre-existing certifications:** We can see whether such outreach is more beneficial for firms with previous certifications (e.g., Women-Owned Small Businesses) who may already be familiar with federal contracting rules, or for those without any previous certifications.
 - **Time in business and registered with SAM.gov:** A meaningful and measurable type of firm that applies to the 8(a) program but is not eligible is a firm without sufficient past business experience. Using SAM.gov information on "entity start date" and "registration date" will allow us to estimate differential effects on each outcome for firms that have been in business for more than 2 (3) years compared with newer firms. Newer firms may be more likely to be ineligible, which would allow us to partially estimate deterrence effects among potentially ineligible firms.

⁸ <https://www.sba.gov/local-assistance/find?type=Small%20Business%20Development%20Center&pageNumber=1>

- **Industry:** We will also be able to look for differential treatment effects by primary NAICS code of firms. Evidence of this could inform future targeting of outreach.
- We can also look at suggestive evidence of effect heterogeneity based on characteristics of firms that submit, recorded in their applications. For example, if we see that firms who submit applications in one treatment group are disproportionately more likely to report female ownership, based on the assumption that female ownership is evenly distributed across firms that were assigned different emails (a plausible assumption with the randomized design), then this would suggest that this treatment was more effective for women-owned firms. We will be able to look at this for gender of owner, age of owner, and net-worth (income plus assets), and – for long-term-outcomes – whether the firm is entity-owned.

Interpretation of interaction effects:

To deepen our understanding of mechanisms, we will also estimate the effect of the interaction between the two factors. To estimate the interaction between the two factors, we will interpret the coefficient on the interaction term in our original model. This coefficient β_3 represents the difference between two differences: 1. the difference in outcomes for those that received both a local resource treatment and a checklist treatment and those that received just the checklist treatment and 2. the difference in outcomes for those that received just the local resource treatment and those that received nothing.⁹

If sending an email changes outcomes, but the content of the email does not matter, we might expect β_3 to be negative. If each factor has a similar effect on outcomes whether the recipient does or does not receive the other factor, we would expect β_3 to be equal to 0. If the factors are complementary, whereby the presence of one magnifies the effect of the other, then we would expect β_3 to be positive.

Long-term effects

We will be able to use the model specification described above to conduct analyses of the emails on additional longer-term outcomes, such as:

- Whether an application was submitted by June 1, 2024 (one full year after the last outreach emails are sent)
- Whether an application was successfully screened as complete by the above future dates
- Whether an application was successfully processed and awarded 8(a) certification by the above future dates
- Whether a firm was awarded federal contracts, as measured in SAM.gov

⁹ Note, this is equivalent to the difference between 1. the difference in outcomes for those that received both a local resource treatment and a checklist treatment and those that received just the *local resource* treatment and 2. the difference in outcomes for those that received just the *checklist* treatment and those that received nothing.

At the point that we have application approval outcomes (for example, one year after the last outreach emails are sent), it may be interesting to examine whether the outreach decreased application processing time. The issue with this analysis is that it is subject to “post-treatment bias,” insofar as processing time is conditional on submission, and we expect the emails to influence submission. If the estimated effect of the emails on submission is small and statistically insignificant, such that we can reject the hypothesis of a positive or negative effect any greater than two percentage points, then we will estimate the emails’ effect on the amount of time from submission to a final decision (certification or rejection) among submitters. This will provide a measure of how these interventions change application processing time. However, if we cannot reject the hypothesis of a positive or negative effect that is at least two percentage points on the change in submission rates, then we will not estimate email effects on processing time. Doing so would conflate 1. differences in time spent processing applications that would have been submitted anyway and 2. emails causing firms with longer or slower processing times to submit applications.

Inference criteria, including any adjustments for multiple comparisons:

We will calculate two-tailed p-values using randomization inference with 10,000 draws from the sampling distribution of the estimators under the sharp null of no effect for any unit.

We will follow the OES SOP for multiple comparisons and report the testwise alpha that would need to be applied in order to achieve a family-wise error rate of 5% under the global sharp null. The family of tests will include six coefficients: for each of the two main outcomes, submission and completeness, we run the regressions described above and focus on three coefficients of interest, β_1 , β_2 , and β_4 . We exclude β_3 from the family of tests as it is an exploratory analysis.

Limitations:

The primary limitation of this study as planned is that the time between intervention and measurement of outcomes is limited. Some firms that will submit applications will not have submitted by July 1, 2024. The primary outcome measures that we will use – whether firms have submitted and been screened by July 1, 2024 – while limited, also capture how quickly an application moves through the process, which is itself an important outcome. Still, because we are not immediately measuring long-term outcomes, we may underestimate the full magnitude of the effects, and we should interpret any effects as lower bounds.