# Evaluating future scenarios for doctoral education in the College of Urban and Public Affairs 

A partnership between the Hatfield School of Government and the Toulan School of Urban Studies and Planning, in the College of Urban and Public Affairs.

Faculty team:
Aaron Golub, Director and Associate Professor, Toulan School of Urban Studies and Planning Billie Sandberg, Associate Professor and Director, Public Affairs and Policy PhD Program, Department of Public Administration, Mark O. Hatfield School of Government
Birol Yesilada, Director and Professor, Mark O. Hatfield School of Government
Connie Ozawa, Doctoral Program Coordinator and Professor, Toulan School of Urban Studies and Planning

Graduate research assistants:
Lauren Everett, Toulan School of Urban Studies and Planning
Romila Chatterjee, Department of Public Administration, Mark O. Hatfield School of Government

January 2022

## Table of Contents

Summary ..... 3
Background ..... 5
Enrollment Trends and Analysis ..... 6
Job Market Analysis ..... 9
Survey of student experiences in SOG and USP doctoral programs ..... 11
Scenarios for consideration by SOG and USP faculty ..... 27
Epilogue - Faculty decide to continue separate programs but seek synergies and collaborations ..... 31
Appendix 1 - Additional analyses of the job market for Ph.Ds ..... 32
Appendix 2 - Job market report from American Political Science Association (APSA) ..... 36
References ..... 39

# Evaluating future scenarios for doctoral education in the College of Urban and Public Affairs 

Summary

In CUPA there are three doctoral programs: the Hatfield School of Government (HSOG) offers a PhD in Public Affairs and Policy (PhD-PAFP), while TSUSP offers a PhD in Urban Studies (PhD-UST) and a PhD in Urban Studies: Regional Science (PhD-USRS). The programs in the two schools are quite different and currently have no overlap. Both programs are nationally ranked and successfully produce top scholars in their respective fields, many of whom go on to careers in academia and non-academic settings. Two emerging challenges have faced the programs over the recent decade: slightly declining enrollments and generally uncompetitive support packages for potential doctoral students. This inspired a conversation between the two programs to explore scenarios to strengthen doctoral education in the college, while possibly reducing costs and improving competitiveness of support packages by consolidating funding into a single student pool. This conversation inspired the proposal for summer 2021 support through the Reimagine PSU program.

Reimagine PSU funding was used to hire two students to help gather data and perform analyses to understand some of the wider challenges and opportunities in doctoral education in the areas of public affairs, public policy, urban studies and city planning. The information generated by that effort is found in this report. In summary, while the report did reveal some concern about funding pressures, most students have some kind of funding (whether the through the college or other research funding on campus) and were overall satisfied with their programs. Matriculation, graduation and job placement trends were also not as alarming as perhaps initially assumed. Job markets in both academic and nonacademic setting seem to be healthy, with a marked increase in the share of non-academic jobs for PhD graduates.

This information inspired the research team to develop a set of scenarios which would be considered by respective faculty in which address some of the challenges and opportunities identified in the research. Those scenarios are:

1. Combine SOG and US programs into single CUPA-wide program
2. Alternate year entries between SOG and USP
3. Retain status quo but overlap/share certain courses opportunistically between SOG and USP

USP also discussed two additional scenarios:
4. Eliminate PhD and restructure the MUS
5. Restructure PhD program for non-academic job market

In the fall, information from the research was shared with the relevant curriculum committees in the two respective schools. After those initial meetings, it was determined that the questions being considered
must be deliberated by the larger faculty in each school. In December, the full faculties of both the School of Government and the Toulan School were able to review report materials and lead discussions on the proposed scenarios.

After deliberations, both schools independently prefer scenario three, and are now planning the next steps in exploring and leveraging synergies between the schools. Independently, USP is exploring some restructuring of the program along the lines of Scenario 5, and will begin a task force in Fall 2022 to develop options for the program to be considered during the 2022-23 academic year.

## Background

In CUPA there are three doctoral programs: the Hatfield School of Government (HSOG) offers a PhD in public affairs and policy (PhD-PAFP), while TSUSP offers a PhD in urban studies (PhD-UST) and a PhD in urban studies: regional science (PhD-USRS). The programs in the two schools currently have no disciplinary overlap, though some students may take electives of their choosing in other schools which may include these schools. (Also please note: the two PhD programs in urban studies share the core required courses. The master in urban studies shares five of the six core courses.) Both programs are nationally ranked and successfully produce top scholars in their respective fields, many of whom go on to careers in academia and public and private research settings.

Nonetheless, some key challenges have emerged over the past few years. Enrollment in the PhD in urban studies has declined slightly over the last decade, though arguably the quality of students remains high, where several graduates in the past few years obtained tenure-track faculty positions in top research universities. Enrollment in the PhD in public affairs and policy has also varied but has proved fairly resilient in recent years with 10 highly qualified students being admitted to the program for Fall 2021. Furthermore, funding support for doctoral students appears to be under pressure from the university and other sources. We already offer weaker packages of support compared to other schools, which extend offers up to four or five years of full guaranteed support. Ours are typically one or two years of support. This means that disadvantages we already have in the competitive market for top doctoral students, may become exacerbated in the near future.

Considering the national conversation around the role and design of doctoral education in the context of shifting opportunities for PhD graduates, along with the pressures for funding and stagnant enrollment, both of these programs have undergone scrutiny in their respective departments. For example, the PhD in urban studies hired an external consultant to conduct comprehensive interviews of faculty and students in 2016 to understand barriers to progress and time to completion issues. Lessons from that review helped to redesign the program to reduce time to completion and improve retention and cohesiveness of the program. Additionally, the faculty in the Departments of Public Administration, Political Science and Economics (the three core departments that support the PAFP degree) have held increasingly urgent conversations around how best to build more streamlined pipelines into the program through their master's programs (i.e., Master of Public Policy, Master of Public Administration, Master of Political Science).

In recent years, new programs in urban studies and public affairs have emerged across the country, notably at USC, Cleveland State, Georgia State, the University of Memphis, and even at the University of Oregon. The emergence of these programs suggests a demand for doctorates in the broader field of public affairs, one which PSU is well-positioned to fill with the right modifications to our offerings..

In 2020, with significant budget cuts looming and the continued stagnation in doctoral applicants and enrollees, we recognize the value of a college wide discussion to understand what might be done to strengthen our programs, including whether the three programs could in some way combine or share coursework or other functions to more effectively utilize college resources. This project will continue that effort.

Faculty involved in this project will develop a set of scenarios for the future of the three programs. This could range from efforts to improve the program separately, along with a spectrum of approaches to combining or sharing teaching or other functions between the three programs. Several of the scenarios will be built on a platform of combining the three doctoral programs into a single college wide doctoral program, in the spirit of sharing administrative resources and services across units. These will still need to be vetted through appropriate faculty discussion and decision-making in the two units, but we expect that by exploring these scenarios, even if they are not fully deployed, they could result in some sharing of core courses or other functions between the two departments.

## Enrollment Trends and Analysis

We downloaded all student enrollment and graduation records for each of the three doctoral programs through Datamaster. Records for the Urban Studies programs go back to 1974, while the PAFP program began in 2011. (Data for the two Urban Studies programs are grouped together, as the lion's share of students are in the main Urban Studies track.) Figures 1 and 2 show initial doctoral student matriculation and graduation counts, respectively, for the three doctoral programs. There is no overwhelming trend in these data for Urban Studies. Higher peaks of incoming and graduating students were experienced in the 1990s and mid-2000's. Still, the past five years shows incoming and graduating student numbers well within the normal range of experience over the last several decades. The public affairs and policy program is much younger but its recent enrollment and graduation rates are within a normal range for its entire history. Neither program is experiencing any alarming decline in enrollment or graduation.


Figure 1. Initial matriculation counts, students per year.


Figure 2. PhD degree conferrals, students per year.

## Job Market Analysis

This section analyzes the job market dynamics for PhDs in Public Administration (PA), Public Policy Analysis (PP) and Urban Studies and City Planning (USP) - by using labor market data on job postings during the period 2016-21. The data was obtained from the Burning Glass Technologies (BGT) toolLabor Insight- which provides options for different filters that one can use to generate a job report in a chosen area by scanning all online job postings. The filters used in this case were, firstly, doctoral degree, in terms of educational qualifications, which generated all job postings that asked for a doctoral degree as either the preferred or the minimum requirement for the job. Secondly, the program of study was used as a filter which resulted in a list of all jobs that required eligible candidates to specialize in a particular area. Urban studies jobs were found using search terms for both 'urban studies' and 'city planning.' Finally, the job postings were filtered by type of employer to differentiate between academic jobs (colleges, universities and professional schools) or non-academic jobs (government (federal and state) and private sector jobs).

The findings are presented in Figures 3 and 4 by the type of employer - Academic and Non-academic. This report in fact finds that number of graduates finding positions outside academia has always been far higher in all of the three areas, and at times, been as high as six times that of the number settling into academic positions. This number is highest in PA - both in terms of the absolute number of jobs for each type of employer, as well as the ratio of government and private jobs to academic jobs (for most years) - followed by PPA and finally USP.


Figure 3. Job offerings in the United States for our three subject areas. (Source: Burning Glass Technologies) (note log scale).


Figure 4. Share of total job offerings in academic settings. (Source: Burning Glass Technologies)

## Survey of student experiences in SOG and USP doctoral programs

## Survey

A survey instrument was adapted from a 2018 survey created and distributed by the Network of Schools of Public Policy, Affairs, and Administration (NASPAA). The survey's stated goal of collecting "systematic data about doctoral student experience in doctoral programs to assess hardships and challenges of academic and personal nature" ( $p 1$ ) is aligned with the objectives of the USP/SOG project. Overall, we are wondering what draws students to the programs and propels them to graduate, and how satisfied are they with their programs? The survey's target respondents are from five groups:

1. Individuals who were accepted but did not matriculate
2. Individuals who matriculated but left the program
3. Current students who are considering leaving the program
4. Students who are currently enrolled in the program and plan to complete it
5. Students who graduated from the program

The survey questions were imported into Qualtrics, and skip logic was used to direct different respondents to relevant questions. Student contact information was obtained from the Director of Recruitment, Outreach, \& Retention at the College of Urban and Public Affairs. This data included email addresses for current students, students who were accepted into one of the programs but did not matriculate, and students who were enrolled in one of the programs but did not complete them. It also included some alumni of the programs, some of whom only had a PSU email address listed. The final list of alumni provided did not have any email addresses associated with it, so we were not able to include those individuals. About fifteen out of the 187 email addresses were returned with an error message. The survey was open for two weeks, and respondents received multiple reminders to complete it. In all, we had 65 respondents to the survey, broken down into the categories shown in table 1.

Table 1. Sample sizes for respondent groups

| Overall sample |  |
| :--- | :--- |
| Graduated | 15 |
| Enrolled and planning to finish | 34 |
| Other (Left, did not matriculate, considering leaving) | 16 |
| PA subgroup | 6 |
| Graduated - PA | 14 |
| Enrolled and planning to finish - PA | 4 |
| Other (Left, did not matriculate, considering leaving) - PA | 4 |
| US subgroup | 9 |
| Graduated - US | 20 |
| Enrolled and planning to finish - US | 12 |
| Other (Left, did not matriculate, considering leaving) - US |  |

## Results

The following sections present some broad punchlines pulled from the data. Some sections have accompanying graphics representing data from the survey analysis.
A. Around $60 \%$ of respondents sought a PhD to pursue a career in academia, with the rate slightly higher for urban studies students
B. The most common time that respondents started considering a doctoral program was midcareer (20-30\%), followed by during graduate school ( $\sim 20 \%$ ).
C. About half of respondents felt they received enough information about their programs, with urban studies students claiming they received less than they needed.
D. During decision-making, more information was needed, but not available, about funding, program fit, employment prospects, and the role of advisors. There were some differences between the two student groups (Figure D).


Figure D. Information lacking during decision-making about doctoral programs.
E. Slightly more than half of respondents who graduated or are enrolled in a PSU would have considered a program at PSU where urban affairs and urban studies were combined (Figure E).


Figure E. Interest in a joint Public Affairs and Urban Studies program at PSU.
F. Various factors contributed to decisions not to enroll in PSU. See figures F1, F2, and F3 for details.


Figure F1. Factors influencing students' decisions not to attend PSU.


Figure F2. Factors pulling respondents to programs other than PSU.


Figure F3. Factors encouraging students to leave PSU.
G. All respondents who graduated from both programs claim to have received some financial assistance from their programs, while only about 65\% of those currently enrolled or "other" (who left, did not matriculate or are considering leaving) received financial assistance. Figure 10 shows sources of financial support used to find respondents doctoral education.


Figure G. Sources of funding for doctoral students.
H. Public affairs and policy students were more likely to be part-time students.
I. Students face a variety of life-changing events during their doctoral studies. Figure I shows some of the responses.


Figure I. Significant life-changing events experienced during doctoral studies.
J. A significant number of students consider leaving their programs, as shown in figure J1. Still, few discuss the question of dropping out with their advisors (figure J2).


Figure J1. The share of students considering to leave their doctoral programs.


Figure J2. Students' willingness to discuss their decision to remain in their programs.
K. Students often feel they are the wrong fit for their programs (figure K1). The reasons for that vary (figure K2).


Figure K1. Students sense of fit with their programs.


Figure K2. Why students sometime feel lack of fit with their programs.
L. A significant portion of students seek help for anxiety or depression during their studies. Figure $L$ shows where they seek help.


Figure L. Sources of help for doctoral students feeling anxious or depressed.
M. Students have mixed experiences with their advisor (figure M).


Figure M. Student experiences with their advisor.
N. Presenting only combined data for both programs, students experienced a range of levels of satisfaction with their programs, as shown in figures N1, N2 and N3.


Figure N1. Students level of satisfaction with their programs, part 1.


Figure N2. Students level of satisfaction with their programs, part 2.


Figure N3. Students level of satisfaction with their programs, part 3.

## Scenarios for consideration by SOG and USP faculty

A final step in this project was to encourage the respective faculties to consider this information in a decision about the future of the doctoral programs in the respective programs. Reflecting on the information developed this project, the author team developed five scenarios for the school's full faculty to consider:

1. Combine SOG and US programs into single CUPA-wide program
2. Alternate year entries between SOG and USP
3. Retain status quo but overlap/share certain courses opportunistically between SOG and USP
4. USP alone: Eliminate PhD and restructure the MUS
5. USP alone: Restructure PhD program for non-academic job market

For each scenario gathered some pros and cons in order to prime the discussion for faculty.

## Combine programs

Create a new CUPA-wide "Urban and Public Affairs PhD" with separate public-affairs-policy track and urban-studies-planning track. A single incoming cohort would be selected each year. Core courses would be taught by both departments to divide the SCH. Electives and tracks would be managed separately by each department. GRAs or other CUPA funding would fund the cohorts, perhaps with attention to splitting evenly between the two tracks.

## Pros:

- Certain elegance of having a single UPA doctoral program
- Economize on administrative costs (right now we compensate PhD program "coordinator" with $\$ 4500$ stipend and one course release).
- There are comparator programs across the U.S. from which to draw inspiration and design.
- Based on survey data of current and former students in the CUPA PhD programs, there is support for this option potentially indicating student interest and marketability.
- More flexibility for students to choose areas of study/interest after entering the program


## Cons:

- USP runs a masters program (MUS) which uses PhD courses - the new program would have to allow these students to also enroll in the new research design/analysis sequences
- Departments lose autonomy to make changes to programs when they see fit
- Coordination of a multidisciplinary program is challenging. The program, its structure and its administration would need to be carefully designed.
- Efficiencies in terms of faculty investment are questionable given the additional time required on an ongoing basis to ensure the integrity of the two tracks.


## Alternate year entries

Alternate incoming cohorts between the two programs, but keep them separate. This would help share the CUPA-wide funding for doctoral programs and allow each department to reduce teaching costs of generally low-enrollment doctoral level courses. (Even with the MUS, many core courses are still occasionally under enrolled.)

## Pros

- Could certainly reduce teaching costs/free up teaching resources in the units as an entire set of courses would move to every-other-year offering
- Reduces administrative burden in terms of reviewing applications, etc.


## Cons

- Timing issues - Projects, grants, research, etc. may demand a doctoral student with a particular skill set, and depending on the place in the admissions cycle, it could be a year or more until the department is bringing in new doctoral students.
- Timing issues relative to course planning; it is difficult to prioritize core PhD courses when they are offered only biannually (in the case of the PAP program).
- Marketing a biannual admissions cycle may be off putting to prospective students.
- Generating and maintaining cohesion and community among cohorts and the program in general would be difficult with multi-year gaps in admissions.


## Retain status quo but overlap/share certain courses opportunistically between SOG and USP

This scenario is already playing out in practice. We've identified one course which we are currently jointly offering and there is potential for others. For example, the last two winters we've had a large group of public affairs students taking in urban studies program evaluation course.

## USP only: Eliminate PhD and restructure the MUS

Terminate the PhD program but retain the MUS, perhaps restructuring the curriculum to better synergize with existing course offerings in the department or with other departments.

## Pros

- Could reduce teaching costs/free up teaching resources in the units if core requirements/specialization, etc. are reduced


## Cons

- PhD students are important for the department's faculty research needs, TA positions, graders.


## USP only: Restructure PhD program for non-academic job market

Various curricular and/or core course changes would be needed to gear the program for the demands of non-academic job markets

## Pros

- Improve match between what students need for changing job market
- Reduce anxiety/illusion about the likeliness of getting an academic job

Cons

- May attract students whose profiles don't support the department's faculty research needs
- Graduates are already entering non-academic jobs, so there is not really a concern

To further discussion in USP faculty meetings, we created a qualitative assessment of the five scenarios with regards to how they impact different metrics of success. This is captured in figure 2.

Table 2. Qualitative evaluation of scenarios

| Scenario | Address <br> faculty/resource efficiency (eliminate lowenrollment courses) | Address <br> mismatch between PhD job market and training | Schools' ability to control of program, cohorts, courses, etc. | Address decline in GRA support |
| :---: | :---: | :---: | :---: | :---: |
| 1. Combine programs | Yes | Possible | Low | Yes |
| 2. Alternate year entries | Yes | No | Low | Yes |
| 3. Retain status quo but overlap/share certain courses opportunistically | Yes - less so | No | High | No |
| 4. USP: Eliminate PhD and restructure the MUS | Unclear | Yes | High | Yes |
| 5. USP: Restructure PhD program for nonacademic job market | No | Yes | High | Yes |

## Epilogue - Faculty decide to continue separate programs but seek synergies and collaborations

During the fall quarter requisite faculty committees and the full faculties of both the School of Government and the Toulan School were able to review report materials and lead discussions on the provided scenarios. Both schools independently preferred scenario three, and are now planning the next steps in exploring and leveraging those synergies between the schools. Independently, USP is exploring some restructuring of the program along the lines of Scenario 5, and will begin a task force in Fall 2022 to develop options for the program to be considered during the 2022-23 academic year.

## Appendix 1 - Additional analyses of the job market for Ph.Ds

In terms of the distribution of jobs by region, in the case of PA, California has been more or less consistently on top for both academic and non-academic jobs. New York and Colorado were also high on the list till 2018-19. Since then, they have often been replaced by Texas and North Carolina, Washington, and also Mississippi in the case of academic jobs. In case of metro area (MSA) however, Washington DC region has consistently come out on top for total number of jobs in all the three areas. Oregon has produced on average 91 non-academic jobs during 201621 in the area, while the number of academic jobs has been very low. Figure A-1 shows the top 12 MSAs in terms of the total number of jobs in PA during 2020-21.


Figure A1-1. Distribution of jobs by region 2020-21 - PA (Source: Burning Glass Technologies)
In the case of PPA, California, Massachusetts and Illinois have consistently produced the highest number of academic jobs whereas California, District of Columbia and Virginia have performed
best in terms of non-academic jobs along with New York. Oregon again has produced only 20 non-academic and about 7 academic jobs on average during the five-year period under consideration. Once again, the top performers by MSA for PPA jobs in 2020-21 are illustrated below.


Figure A1-2. Distribution of jobs by region 2020-21 - PPA (Source: Burning Glass Technologies)

In the case of USP, most of the same states performed relatively well though the total number of jobs, both academic and non-academic was much lower.

In the case of academic jobs in all areas of Political Science put together, APSA puts the Northeastern region of the U.S. on top, followed by South and West. However, this representation in terms of broad U.S. regions belies the vast dispersions at a level of the state or the MSA. In terms of international academic jobs in the area of Political science, Europe
comes out on top (APSA report 2017-18) offering $57 \%$ of all the jobs while Asia is second at $31 \%$. Contribution by other world regions is negligible.

## Distribution of academic jobs by nature of position

Of the three areas, PA offered the highest number of academic positions though, for most years, the ratio of teaching positions to administrative roles was similar in PA and PPA. In the case of USP on the other hand, the much smaller number of roles were mostly teaching positions with fewer research positions. Administrative roles were almost negligible. More details with job titles by academic institutions are provided in the excel sheets. Figure A1-3 sums up the comparison across the three fields in terms of the number of jobs by nature of the role during 2020-21.



Figure A1-3: Top occupations within the academic category for PA, PPA and USP (in that order from top to bottom) for the year 2020-21 (Source: Burning Glass Technologies)

## Appendix 2 - Job market report from American Political Science Association (APSA)

APSA reported a total of 1245 postings on the eJobs site for July through June on average for 2010-2014. During the 2015-2016 academic year the number of postings was 1260 . The postings largely were for positions in the Northeast region of the US (29\%), and the Midwest (15\%). Also, a small proportion of postings on eJobs were for regions outside the United States (13.5\%). The largest number of international postings was for the European region including the United Kingdom (37\%), followed by Asia (24\%). An analysis of these ads reveals that specialization in a certain topic that is cross- or multi-subfield was preferred. Some of the coveted specialization were in quantitative, survey, experimental methods or 'big data' analysis, international political economy, and, public policy, administration, or management.

During the 2017-2018 academic year 1,292 job postings were made. Postings for positions in the US were generally for positions in the US Northeast (33.4\%), South (32.6\%), or West (19.3\%). Of the states, California (10.6\%), New York (7.9\%), and New Jersey (5.0\%) had the highest number of postings. Postings for positions outside the U.S. comprised $15.4 \%$ of all postings from July 2017 through June 2018. Most international postings were again located in Europe (57.0\%), followed by Asia (31.1\%). The breakup between the subfields for the year 201718 as reported by APSA is illustrated in Figure A2-1. The major share goes to International Relations. However, according to this report, a slightly higher percentage of the jobs go to Public Policy (about 8\%) than to PA (about 5\%). Also, the share of Non-Academic jobs is negligible which contradicts with both, the findings from the job postings analysis and those of Rahm, et al. (2015).


Figure A2-1 (Source: APSA)

During the 2019-2020 academic year, a total of 967 job advertisements were posted on APSA's eJobs site. This was a significant decrease (-18.33\%) from 2018-2019. Colleges and Universities in California, New York, Massachusetts, New Jersey, and Pennsylvania supplied the highest number of job postings. Together, postings in these states comprised $41.54 \%$ of all postings in the US in the academic year 2019-2020. The most advertisements for jobs in the US were for positions in the Northeast (32.94\%), followed by the Midwest (18.31\%), the Southeast (15.1\%), and the West (14.27\%). Postings for international jobs outside the U.S. made up $17.3 \%$ of all postings from July 2019 through June 2020. This proportion was slightly higher than in 2018-

2019, when just under $15 \%$ of all job postings were international, indicating that international postings decreased at a slower rate than in the US job market. Most international postings were in Europe (44.91\%), followed by Asia (26.95\%) and Canada (14.97\%). The categories Public Policy and Political Theory supplied a significant number of positions, at $8.69 \%$, $7.55 \%$ respectively. The categories Methodology, Public Law and Public Administration, each offered less than 4\% of job postings.

For Political Science overall, APSA reported an average of 1239 job postings in academics between 2010 and 2018 as illustrated in Table A2-1. There is no upward trend, rather, the number holds more or less holds steady with minor ups and downs.

Table A2-1: Total eJobs postings during 2010-2017 academic years (Source: APSA)

| Academic Years | Total |
| :---: | :---: |
| $2010-2011$ | 1,215 |
| $2011-2012$ | 1,298 |
| $2012-2013$ | 1,238 |
| $2013-2014$ | 1,230 |
| $2015-2016$ | 1,260 |
| $2016-2017$ | 1,141 |
| $2017-2018$ | 1,292 |
| Average | 1,239 |

## References

Rahm, D., Brittain, V., Brown, C., Garofalo, C., Rangarajan, N., Shields, P., \& Yun, H. J. (2015). Exploring the demand for PhDs in public affairs and administration. Journal of Public Affairs Education, 21(1), 115-128.

Cordes, J., Conger, D., Ladd, H., \& Luger, M. (2008). Undergraduate and doctoral education in public policy: What? Why? Why not? Whereto? Journal of Policy Analysis and Management, 27(4), 1009-1026.

