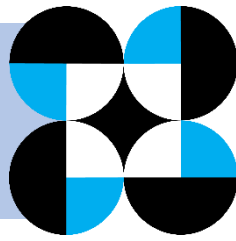# ANALYSIS OF FACTORS AFFECTING THE EFFICIENCY OF DEPARTMENT OF SCIENCE AND TECHNOLOGY (DOST) GRANTS-IN-AID (GIA) PROGRAM, 2019

**Razo, Armela K., Santos, Emiliano III M., & Ayson, Allen Joseph G.**
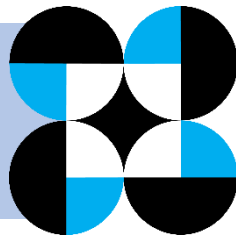**DOST – Central Office**

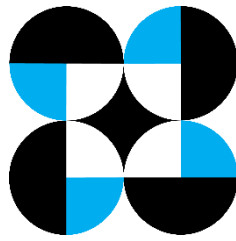**Assistant Secretary Maridon O. Sahagun**
**DOST**

# INTRODUCTION

- The Department of Science and Technology (DOST) is the country's leading agency in science, technology and innovation with a mandate of providing central direction to all STI activities in the Philippines.

- The DOST Grants-in-Aid (GIA) program is a funding mechanism designed to amplify the research and innovation activities in the country (AO No. 009, 2017).

- However, institutional weaknesses affect the utilization of DOST which is directly related to the efficiency of the R&D sector.

14th NCS National Convention on Statistics
1-3 October 2019 | Crowne Plaza Manila Galleria
Organized by the Philippine Statistical System
Spearheaded by the Philippine Statistics Authority

# INTRODUCTION

- For R&D to succeed in a country, there should be a strong government role in its setting. By this means, the government should provide a healthy and nurturing environment for R&D to be successful.

- Translating the technology innovation to economic growth means that a robust R&D in the country must be in place.

14th NCS National Convention on Statistics
1-3 October 2019 | Crowne Plaza Manila Galleria
Organized by the Philippine Statistical System
Spearheaded by the Philippine Statistics Authority

# OBJECTIVE OF THE STUDY

**General:**

To prove if the factors identified affect the implementation of DOST-GIA Program.

**Specific:**

- To determine the factors affecting the implementation of DOST-GIA program;
- To assess if the factors identified are statistically significant on the implementation of the program;
- To examine the impact of factors identified on the implementation of DOST-GIA program; and
- To provide policy recommendations on the continual improvement of funding mechanism of DOST-GIA program
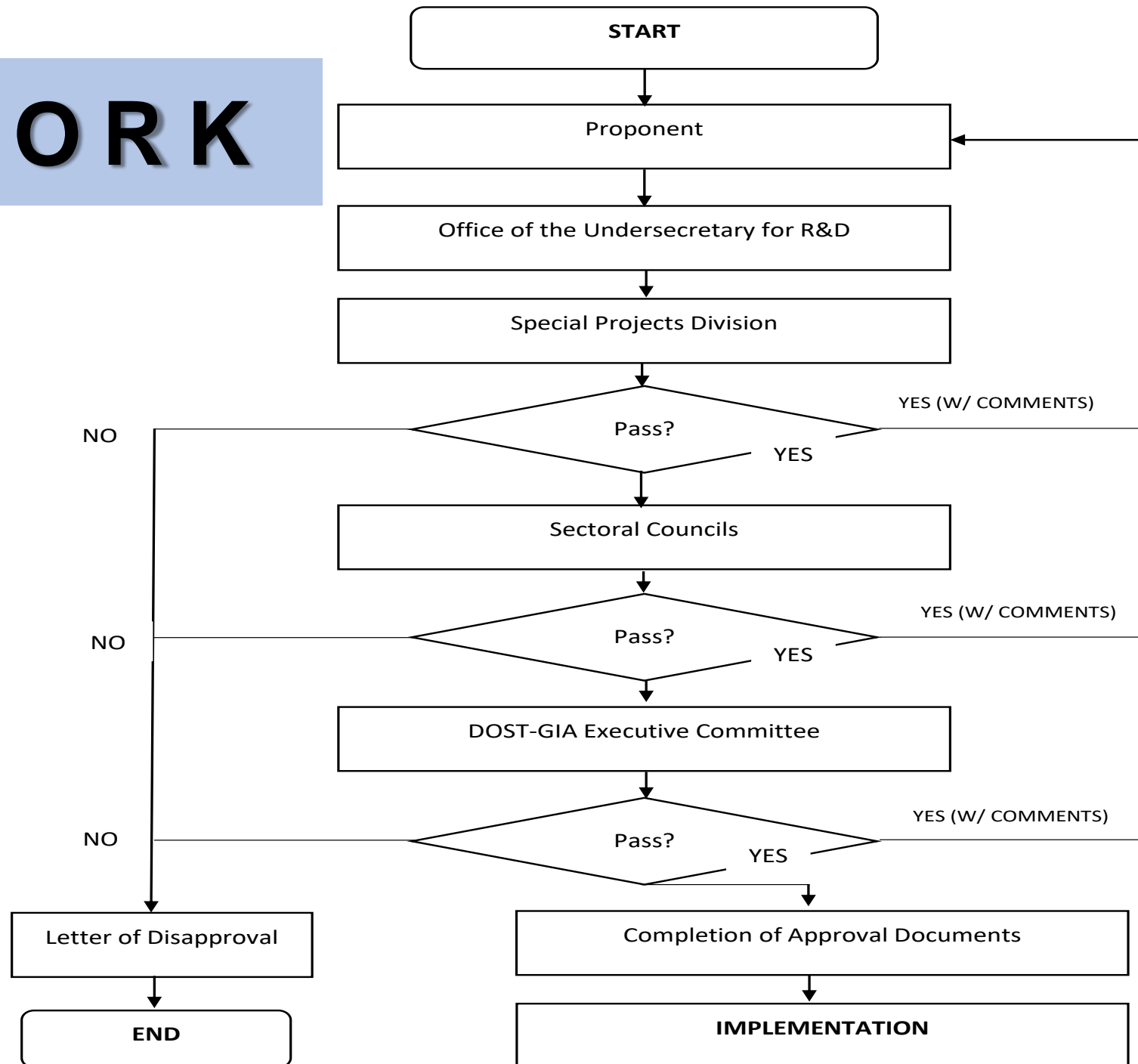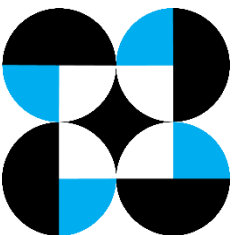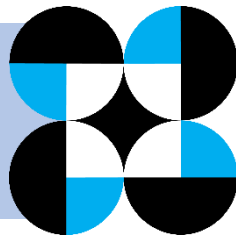
# FRAMEWORK



Figure 2. The Conceptual Framework of the System of Funding Mechanism of DOST-GIA Program obtained from the presentation of Undersecretary R.C.L. Guevara
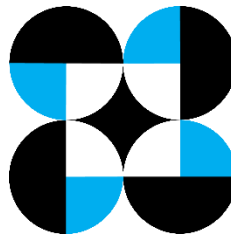
$$\pi_i = \text{Prob}(Y_i = 1 | X_i = x_i) = \frac{\exp(\beta_0 + \beta_i x_i)}{1 + \exp(\beta_0 + \beta_i x_i)}$$

- Logistic regression is a statistical method analyzing data in which one or more independent variables are determining an outcome of two (2) values (e.g. dichotomous).

- Using a logistic regression model, the study was able to provide details whether the factors identified have <u>influenced</u> or <u>not</u> the implementation of DOST-GIA program.

14th NCS National Convention on Statistics
1-3 October 2019 | Crowne Plaza Manila Galleria
Organized by the Philippine Statistical System
Spearheaded by the Philippine Statistics Authority

# Results & Discussion

- From a total of 1,541 new DOST-GIA projects approved from year 2000-2018, 498 projects were randomly selected.

- Projects were selected from the DOST sectoral council – PCAARRD, PCHRD, PCIEERRD, & NRCP.
  - PCAARRD & PCIEERD has the highest number of projects since many of its projects were funded under the DOST-GIA program.

Table 2. Distribution of DOST-GIA projects per sectoral council based on the designed sample size.

| SECTORAL COUNCIL | NUMBER | % |
|---|---|---|
| NRCP | 45 | 9.42 |
| PCAARRD | 149 | 29.86 |
| PCHRD | 51 | 10.02 |
| PCIEERD | 253 | 50.70 |
| T O T A L | 498 | 100 |

# Results & Discussion
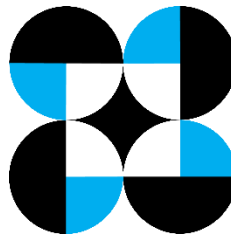
Table 3. Summary of factors affecting the implementation of DOST-GIA-funded projects.

| VARIABLE | AFFECTED | NOT AFFECTED |
|---|---|---|
| **Delayed Budget Release** | 347 (69.68%) | 151(30.32%) |
| **Procurement Process** | 348 (69.88%) | 150 (30.12%) |
| **Extensive Time in Signing Agreement** | 254 (51.00%) | 224 (49.00%) |
| **Hiring of Staff/Personnel** | 223 (44.78%) | 275 (55.22%) |
| **Force Majeure** | 111 (22.29%) | 387 (77.71%) |

- Major factors affecting the implementation of projects are delayed budget release, procurement process, and extensive time in signing agreement.

- Least factors affecting the implementation of projects are hiring of personnel/staff and force majeure.

14th NCS National Convention on Statistics
1-3 October 2019 | Crowne Plaza Manila Galleria
Organized by the Philippine Statistical System
Spearheaded by the Philippine Statistics Authority

# Results & Discussion
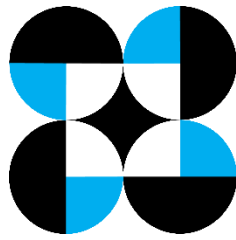
Table 8. Distribution of DOST-GIA-funded projects according to the number of days delayed.

| NUMBER OF DAYS DELAYED | FREQUENCY | % |
|---|---|---|
| 0 days | 285 | 57.23 |
| 1-30 days | 33 | 6.63 |
| 31-75 days | 71 | 14.26 |
| 76-150 days | 82 | 16.47 |
| 151-360 days | 26 | 5.22 |
| >361 days | 1 | 0.20 |
| TOTAL | 498 | 100 |

- The number of days delayed per project measures how long the DOST-GIA-funded projects were able to complete its requirement before implementing
  - Majority did not changed/moved its implementation date (57.23%).
  - Less than half have changed/moved its implementation for 1-360 days (47.57%).
  - Only one project has changed/moved its implementation date for more than a year (0.20%).
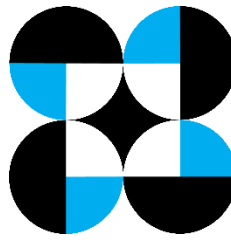
# Results & Discussion

Table 9. Distribution of DOST-GIA-funded projects according on budget allocated.

| BUDGET ALLOCATED (₱) | FREQUENCY | PERCENTAGE (%) |
|---|---|---|
| 0 – 500,000 | 20 | 4.02 |
| 500,001 – 1,000,000 | 33 | 6.63 |
| **1,000,001 – 5,000,000** | **228** | **45.78** |
| **5,000,001 – 10,000,000** | **92** | **18.47** |
| **10,000,001 – 25,000,000** | **91** | **18.27** |
| **25,000,001 – 50,000,000** | 22 | 4.42 |
| **>50,000,001** | **12** | **2.41** |
| TOTAL | 498 | 100 |

- Most of the DOST-GIA projects were funded with at least PhP 1-5M for the past 20 years.

14th NCS National Convention on Statistics
1-3 October 2019 | Crowne Plaza Manila Galleria
Organized by the Philippine Statistical System
Spearheaded by the Philippine Statistics Authority
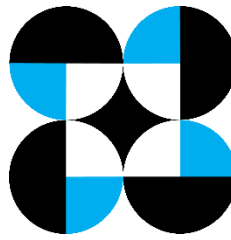
Table 10. Logistic Regression Analysis of DOST-GIA-funded projects (Coefficient).

| VARIABLE | COEFFICIENT | 95% CONFIDENCE LIMIT | | P-VALUE |
|---|---|---|---|---|
| | | LOWER | UPPER | |
| Constant | -1.610039 | -2.157951 | -1.062126 | 0.000 |
| Budget allocated for Year 1 [ns] | $6.55 \times 10^9$ | $-1.49 \times 10^8$ | $-2.80 \times 10^8$ | 0.549 |
| Number of days delayed [ns] | 0.0018154 | -.0042602 | .0078909 | 0.558 |
| Delayed budget release* | 1.295223 | 0.625475 | 1.96497 | 0.000 |
| Procurement process* | 2.608377 | 1.883153 | 3.333601 | 0.000 |
| Extensive period of signing agreement* | 1.72619 | 0.6875016 | 2.764878 | 0.001 |
| Hiring of staff/personnel* | 1.438452 | 0.2351202 | 2.641784 | 0.019 |
| Force majeure [ns] | 0.3600634 | 0.983363 | 1.648463 | 0.584 |

n = 498
$\chi^2$ = 281.59
df = 7
P > $\chi^2$ = 0.00

*= significant at 5%
[ns]= not significant at 5% level of probability

**Indicator's Coefficient Signs**: determine effect of the independent variables on the dependent variable.

- Logistic regression model shows that <u>delayed budget release</u>, <u>procurement process</u>, <u>extensive time for signing agreement</u>, and <u>hiring of staff/personnel</u> all have **positive** sign, thus <u>more likely to affect</u> the implementation of DOST-GIA program.

- *<u>Budget allocated for year 1</u>, number of days delayed, & <u>force majeure</u> – not statistically significant.*

14th NCS National Convention on Statistics
1-3 October 2019 | Crowne Plaza Manila Galleria
Organized by the Philippine Statistical System
Spearheaded by the Philippine Statistics Authority

# Results & Discussion
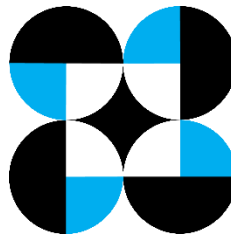
Table 11. Logistic Regression Analysis of DOST-GIA-funded projects (Odds Ratio)

| VARIABLE | ODDS RATIO | 95% CONFIDENCE LIMIT | | P-VALUE |
|---|---|---|---|---|
| | | LOWER | UPPER | |
| Constant | 0.1998799 | 0.1155617 | 0.3457199 | 0.000 |
| Budget allocated for Year 1[ns] | 1 | 1 | 1 | 0.549 |
| Number of days delayed[ns] | 1.001817 | .9957489 | 1.007922 | 0.558 |
| Delayed budget release* | 3.651809 | 1.869134 | 7.1347 | 0.000 |
| Procurement process* | 13.577 | 6.574203 | 28.03913 | 0.000 |
| Extensive period of signing agreement* | 5.619203 | 1.988741 | 15.87711 | 0.001 |
| Hiring of staff/personnel* | 4.214168 | 1.265061 | 14.03823 | 0.019 |
| Force majeure [ns] | 1.43342 | 0.3952107 | 5.198984 | 0.584 |

n = 498
$\chi^2$ = 281.59
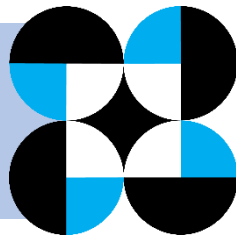df = 7
P > $\chi^2$ = 0.00

*= significant at 5%
[ns]= not significant at 5% level of probability

**Odds-ratio effects**: to understand the effect of the treatment of the outcomes.
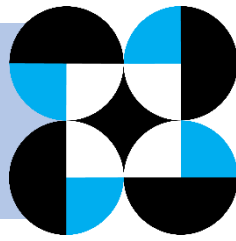
- The delayed budget release, procurement process, extensive time for signing agreement, and hiring of staff/personnel are more likely to affect the implementation of DOST-GIA program.

- *Budget allocated for year 1, number of days delayed, and force majeure – not statistically significant.*

14th NCS National Convention on Statistics
1-3 October 2019 | Crowne Plaza Manila Galleria
Organized by the Philippine Statistical System
Spearheaded by the Philippine Statistics Authority

# CONCLUSION

- The <u>implementation of DOST-GIA program</u> has been <u>aggravated</u> by different factors causing delays which <u>resulted in inefficient process</u>.

- The study was <u>able to establish a significant relation</u> between the <u>implementation of DOST-GIA-funded projects</u> and the <u>factors identified</u>.

- Delayed budget release, procurement process, extensive period of signing agreement, and hiring of personnel/staff <u>negatively affect</u> the implementation of DOST-GIA-funded projects.

14th NCS National Convention on Statistics
1-3 October 2019 | Crowne Plaza Manila Galleria
Organized by the Philippine Statistical System
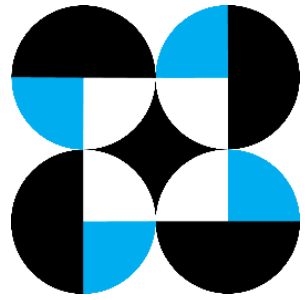Spearheaded by the Philippine Statistics Authority

# RECOMMENDATIONS

- Improve the procurement process especially on STI-related programs and projects to enhance the innovation ecosystem in the country.

- Fully implement the DOST monitoring and evaluation (M&E) protocol for better processing procedure.

- Improve competencies of STI support personnel (non-technical and administrative personnel).

14th NCS National Convention on Statistics
1-3 October 2019 | Crowne Plaza Manila Galleria
Organized by the Philippine Statistical System
Spearheaded by the Philippine Statistics Authority

# DEPARTMENT OF SCIENCE AND TECHNOLOGY

DOST Building, General Santos Ave., Bicutan, Taguig City 1631

www.dost.gov.ph

# THANK YOU!

14th NCS National Convention on Statistics
1-3 October 2019 | Crowne Plaza Manila Galleria
Organized by the Philippine Statistical System
Spearheaded by the Philippine Statistics Authority
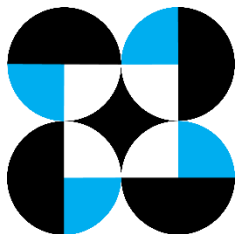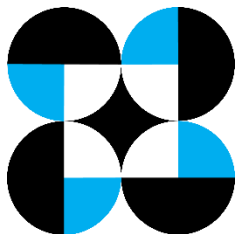
# Reference

- Albert, J.R.G., Quimba, M.A., Serafica, R.B., Llanto, G.M., Vizamos, J.F.V., & Bairan, J.C.A. (2017). *Measuring and Examining Innovation in Philippine Business and Industry.* PIDS Discussion Paper Series No. 2017-28, Philippine Institute of Development Studies.

- Binomial Logistic Regression Analysis using Stata. UCLA: Statistical Consulting Group. https://statistics.laerd.com/stata-tutorials/binomial-logistic-regression-using-stata.php

- Cornell University, INSEAD, and WIPO (2018): *The Global Innovation Index 2018: Energizing the World with Innovation.* Ithaca, Fontainebleau, and Geneva

- Cororaton, C. B. (2003). *Research and Development and Technology in the Philippines* (Vol. 10). Makati City: Philippine Institute for Development Studies.

# Reference

- DOST Administrative Order No. 009 (2017).

- DOST Administrative Order No. 014 (2019).

- Logistic Regression | Stata Data Analysis Examples. UCLA: Statistical Consulting Group. https://stats.idre.ucla.edu/stata/dae/logistic-regression/

- OECD. (1997). *National Innovation Systems*. OECD Publication, Paris.

- OECD (2015), *Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development*, The Measurement of Scientific, Technological and Innovation Activities, OECD Publishing, Paris. *DOI: http://dx.doi.org/10.1787/9789264239012-en*

# Reference

- Pernia, E.M. & Clarete, R.L. (2014). *Investing in S&T and R&D in face of AEC Competition.* PCED Policy Notes No. 2014-04, Philippine Center for Economic Development.

- Todaro M.P. & Smith S.C. (2015). *Economic Development 12th Edition.* New Jersey. Pearson Education Inc.

- USAID. (2014). *Science, Technology, Research and Innovation for Development (STRIDE) Philippines Innovation Ecosystem Assessment* 2014. RTI International.

- Schwab, K. (2018) World Economic Forum. The Global Competitiveness Report 2018. Available at: http://www3.weforum.org/docs/GCR2018/05FullReport/TheGlobalCompetitivenessReport2018.pdf