EPSCOR: State Science and Technology-Based Economic Development Policies and the Role of Higher Education Institutions

Kendall D. Deas, Ph.D
Post-Doctoral Fellow in Race, Freedom, and Democratic Citizenship
African American Studies Program
Institute for African American Research (IAAR)
University of South Carolina
Gambrell Hall; Room 258
817 Henderson Street
Columbia, SC 29208
United States

Introduction

In examining state science and technology-based economic development policies, it is clear that higher education institutions have played a significant role in these policies to promote regional economic development. Some of the more recent post-World War II examples of state efforts to achieve regional economic development include promoting industry cluster development, establishing a knowledge-based economy and research parks, and attracting industry to regions through state-based economic development strategies such as the Experimental Program to Stimulate Competitive Research (EPSCOR) involving research universities (Hauger, 2004).

This research provides an overview of peer-reviewed studies concerning state science and technology-based economic development strategies with a primary focus upon those related to EPSCOR projects such as their overall effectiveness, impact on economic development, and the impetus of their adoption. The paper provides a descriptive synthesis of EPSCOR and South Carolina's involvement in this National Science Foundation (NSF) initiative. Given the importance of the issue of access in higher education, this paper also provides an overview of peer-reviewed studies concerning STEM programs and assesses the policy goal of the EPSCOR program in South Carolina to increase the number minority students from within the state entering undergraduate and graduate schools to complete degree programs in science, technology, engineering, and math related fields where they are currently underrepresented.

Literature Review of Extant Studies

Previous Research Concerning EPSCOR

When one examines the issue of state science and technology-based economic development policies or strategies and the role of higher education institutions, it becomes clear that there are few studies within the field that actually evaluate EPSCOR as a program or even within individual states (Melkers & Wu, 2009). In fact, many of the studies that have been conducted have tended to take more of a statewide macro-level approach (Melkers & Wu, 2009). However, there are some substantive peer-reviewed studies that have been conducted in the field by Melkers and Wu (2009) and Hauger (2004) that essentially trace the evolution of the program, evaluate the improved research capacity of EPSCOR states, and assess the program's "impact on the academic research and development (R&D) expenditures financed by state governments" (Wu, 2009, p. 1).

In *Evaluating the Improved Research Capacity of EPSCOR States: R&D Funding andCollaborative Networks in the NSF EPSCOR Program*, Melkers and Wu (2009) conduct a critical study that evaluates the improved research capacity of EPSCOR states. Melkers and Wu (2009) note that there is considerable variance in terms of respective states' abilities to attract federal R&D sources. These scholars are principally concerned with how the EPSCOR Program has improved states' research capacities. Melkers and Wu (2009) essentially argue that a social capital based approach addressing capacity development best addresses this issue. In order to assess a direct outcome of capacity building, Melkers and Wu (2009) evaluate the data of federal academic R&D obligations. Further, the scholars engage in a descriptive statistical analysis that focuses upon the actual share of federal academic R&D obligations in recent years for respective states (Melkers, & Wu, 2009). Melkers and Wu's (2009) study presents data conveying distinctions that exist between scientists in states that are involved in EPSCOR and states that are not involved in the program using a NSF survey of scientists from all 50 states. These scholars' research also draws distinctions between scientists that have

actually been involved in EPSCOR and those who have not been involved in the initiative (Melkers & Wu, 2009). Melkers and Wu (2009) find important evidence of capacity development in EPSCOR states. Most significantly, their research makes a valuable contribution to the field because their results lay the groundwork for possibly identifying important evaluative issues for the EPSCOR Program (Melkers & Wu, 2009).

Yonghong Wu (2009) in *NSF's Experimental Program to Stimulate CompetitiveResearch (EPSCOR): Subsidizing Academic Research or State Budgets* conducts valuable research that is a critical cross-state empirical study examining the EPSCOR Program and its impact on academic R&D expenditures that are financed by state governments. Wu (2009) employs panel data of all 50 states during the time period of 1976 to 2006. The empirical results from this data show that while EPSCOR increased federal (R&D) support to EPSCOR states, the program essentially crowded-out financial support for academic research from the state governments of EPSCOR states (Wu, 2009). In fact, Wu's (2009) research reveals thatapproximately one-third of EPSCOR Program funds actually went to subsidize state budgets. Further, Wu (2009) argues that this crowd-out effect resulting from the program suggests that there should be a reconsideration of the EPSCOR Program's design to at least maintain or perhaps increase financial support from state governments for academic research activities that are central or crucial to both academic competiveness and regional economic development.

Scott Hauger (2004) provides one of the most comprehensive studies in the field concerning the EPSCOR initiative. In *From Best Science Toward Economic Development: TheEvolution of NSF's Experimental Program to Stimulate Competitive Research (EPSCOR)*, Hauger (2004) traces the evolution of the EPSCOR Program. Hauger's (2004) research reveals that state governments have had strong incentives to use the EPSCOR Program as a means to achieve a state economic agenda. Most significantly, he brings to the forefront the fact that initially, economic development was essentially an emerging as opposed to primary mission for the program (Hauger, 2004). Hauger (2004) reveals that the institutions designed to govern EPSCOR allowed states in the program to basically incorporate an economic development mission. Hauger's (2004) research shows that the primary mission of the program initially was to increase scientific research in states through collaborative efforts. His study highlights the increasing economic development orientation of several successful EPSCOR proposals and programs (Hauger, 2004). Most importantly, Hauger's (2004) study is significant because he offers some constrictive observations concerning the possible trade-offs between best science and economic development goals for states.

Role of Research Universities in State Economic Development Objectives

There are a number of valuable peer reviewed studies in the field that provide substantive and comprehensive overviews of state science and technology-based economic development policies or strategies involving states' research universities. Walter Plosila (2004) in *State Science and Technology-Based Economic Development Policy: History, Trends and Developments, and Future Directions*, assesses the historical evolution of state (S&T) based economic development strategies since the 1960s. Plosila's (2004) study identifies particular trends and current emphases along with potential future directions of state strategies to promote regional economic development. The significance of Plosila's study is that he shows that state (S&T) based policy strategies involving research universities have had a considerable impact on the overall practice of state economic development.

Several scholars within the field highlight the critical role research universities play in relation to technology transfer efforts to achieve regional economic development. Feldman and Stewart (2008) in *Wellsprings of Modern Economic Growth: Higher Education, Innovation, and Local Economic Development* bring to the forefront the idea that one of the new responsibilities of higher education institutions is to create effective technology transfer mechanisms to aid in state economic development. Feller (1990) in *Universities as Engines of R&D-Based EconomicGrowth: They Think They Can*, also examines the process of technology transfer but suggests that universities' efforts to promote the commercialization of technological innovations diminishes institution's traditional emphasis on learning and impacts the characteristics of academic research. In a related study, Feller (2004) concludes in *Virtuous and Vicious Cycles*

6. *The Contributions of Public Research Universities to State Economic Development Objectives*, that state governments are selectively enhancing S&T based research initiatives while gradually drawing support for general education infrastructure.

Maryann Feldman (2002) also examines the role of research universities in local economic development along with issues of equity and technology transfer, and the concept or idea of entrepreneurial universities (Feldman, Feller, Bercovitz, & Burton, 2002; Bercovitz & Feldman, 2006; Feldman & Desrochers, 2003). In *Research Universities and Local Economic Development: Lessons From the History of The Johns Hopkins University*, Feldman and Derochers (2003) provide a detailed analysis of The Johns Hopkins University and show how some major research universities

have had a limited direct impact on their regional economy in relation to benefits measured by indicators such as "university-industry cooperative relationships and spin-off companies" (p. 6). Further, Feldman (1994) reveals in *The University and Economic Development: The Case of Johns Hopkins University and Baltimore* that the existence of a prominent research university in a particular area does not necessarily lead to enhanced economic development in the region.

Feldman, Feller, Bercovitz, and Burton (2002) highlight in *Equity and the Technology Transfer Strategies of American Research Universitie s*how universities use equity licensing transactions. These scholars view this as a function of certain behavioral factors related to an institution's previous experiences with the licensing process, their level of success as compared to other institutions, the organization of the technology transfer office along with structural characteristics (Feldman, Feller, Bercovitz, & Burton, 2002).

7. Bercovitz and Feldman (2006) examine the idea or concept of universities being entrepreneurial in their involvement with technology transfer in *Entrepreneurial Universities and Technology Transfer: A Conceptual Framework for Understanding Knowledge-Based Economic Development*. These scholars employ the term entrepreneurial to refer to changes that reflect a more active role research universities are undertaking to promote the transfer of academic research (Bercovitz & Feldman, 2006). Bercovitz and Feldman's (2006) research is significant because they offer a framework which incorporates "economic, social, and political influences affecting universities' capacities to create new knowledge that can be utilized to achieve economic growth (p. 175). Gunasekara (2006) in *Reframing the Role of Universities in the Development of Regional Innovation Systems* also examines the impact universities have had upon regional innovation and development. Gunasekara's (2006) research is an important contribution to the field because he proposes a useful conceptual framework based upon the "triple helix model of university, industry, and government relations" to analyze existing variations in the roles of research universities (p. 101).

STEM Studies

Given EPSCOR's goal of increasing the number of students particularly from underrepresented minority groups pursuing undergraduate and graduate degrees in science, technology, engineering, and math (STEM) related fields, it is useful to examine previous peer-reviewed research in this area. Malcom and Dowd (2012) in *The Impact of Undergraduate Debton the Graduate School Enrollment of STEM Baccalaureates* offer a substantive study that investigates the impact of undergraduate debt on graduate and professional school enrollment

8. among STEM bachelor's degree holders. These scholars examine whether a reliance on loans as a central feature of financial aid policy is reducing investments in graduate and professional study in STEM areas among students from underrepresented minority groups (Malcom & Dowd, 2012). The significance of Malcom and Dowd's (2012) study is that they found that for all racial groups and Latinos, borrowing reduces the chances of attending graduate school. In fact, the Council on Graduate Schools has awarded grants to some 21 institutions to assess how to improve Ph.D attrition and completion rates for black, Hispanic, and Native American students pursuing doctoral degrees in STEM fields (Patton, 2012). Before having access to graduate schools, these students must first have access to quality undergraduate programs. Smith, Clarke-Douglas, and Cox (2008) in *Supportive Teaching and Learning Strategies in STEM Education* focus upon this issue of access to quality undergraduate education. These scholars examine pedagogical approaches to aiding underrepresented minority groups in having access to supportive and quality education in STEM areas (Smith, Clarke-Douglas, & Cox, 2008). Smith, Clarke-Douglas, and Cox (2008) argue for high expectations within a supportive climate to enhance the student experience.

Access Studies

The issue of increasing access to higher education particularly as it relates to critical STEM fields is a major goal embraced by EPSCOR. Therefore, it is constructive to note some leading studies concerning issues of access to higher education. Perna, Rowan-Kenyon, Bell, and Thomas (2008) in *A Typology of Federal and State Programs Designed to Promote College Enrollment* address this issue and make a valuable contribution to the field by developing a

9. typology focusing upon government sponsored programs to reduce enrollment gaps among racial-ethnic and socioeconomic groups. Further, they suggest that these programs lack coherence (Perna, Rowan-Kenyon, Bell, & Thomas, 2008). The issue of financial aid has consistently been a key factor impacting access to higher education. Bettinger, Long, Oreopoulos, and Sanbonmatsu (2009) in *The Role of Simplification and Information in College Decisions: Results from the H&R Block FAFSA Experiment* provide a valuable study that examines the issue of improving college access by simplifying the application process and enhancing the overall visibility of government support programs such as financial aid.

Finally, the changing economic and demographic dynamics in the nation are forcing policymakers to consider adjusting the policy framework and evaluate admissions policies. Callan (2011) in *Reframing Access and Opportunity: Public Policy Dimensions* and Horn and Flores's (2011) study *Race-Conscious Decision-Making in a State-Driven Admissions Process:*

Texas, the University of Texas at Austin, and the Top Ten Percent Plan examine how these changing dynamics are leading to a reconsideration of higher education policy and practices to increase access along with race-conscious approaches to admissions decision-making to enhance educational equity in response to national demographic shifts.

EPSCOR: An Overview

The EPSCOR Program is a post-World War II example of a state science and technology-based policy initiative where higher education institutions have played a significant role in assisting states to achieve regional economic development. The program essentially began in 1979 through initiatives from the National Science Foundation (Lambright, 1999). The program

10. Was created in response to criticism from the U.S. Congress that NSF was not enhancing scientific research across the country which was essentially a requirement of its original act (Leath, 1991). In fact, many congressional members argued that the peer-review process employed by the NSF to award R&D grants was a rather elitist system that tended to ignore smaller universities and states (Leath, 1991). There was also much political pressure from congressional members from states that traditionally did not receive much federal funding for the enhancement of their S&T capacity (Talmadge, 1991).

In 1991, the program operated on a small budget of about $11 million in order to generate support for science and engineering in a total of 16 states and Puerto Rico (Leath, 1991). By the late 1990s, EPSCOR had expanded into a $38 million-a-year program involving 18 states and Puerto Rico (Mervis, 1997). The overall success of the NSF's program resulted in the establishment of programs in a total of six mission agencies that offered EPSCOR Program funding (S.C. EPSCOR/Idea Program, 2008). There is EPSCOR Program funding offered by the National Science Foundation, Department of Energy, Department of Defense, Department of Agriculture, National Aeronautics and Space Administration (NASA), and the Environmental Protection Agency (S.C. EPSCOR/IDEA Program, 2008). The purpose of the program is to implement measures to aid less competitive states in the South and other regions that have traditionally received less federal funding to enhance their S&T capacity (Lambright, 1999). The program focuses upon addressing the geographic imbalance in terms of the distribution of federal research funds as there was less funding going to the South and upper Midwest regions of the U.S. (Mervis, 1997). There are competition and peer review components of the program with less competitive states competing against each other (Lambright, 1999). The states do not apply

11. To participate in the EPSCOR Program but are chosen instead by the NSF (Leath, 1991). The process for selection essentially begins with a pool of states that have consistently ranked below a particular level of research grants for several years (Leath, 1991). Further, the states that comprise this pool are rated in three ways by their federal and NSF research support (Leath, 1991). First, the states are rated by total grants for all research (Leath, 1991). Second, these states are rated by total grants per academic scientist or engineer (Leath, 1991). Third, the states that comprise this pool are rated by total grants per capita (Leath, 1991). In short, the idea or notion here is that there will be both winners and losers in the process (Lambright, 1999). Further, supporters of the program contend that EPSCOR is designed to provide incentives for states and their researchers to engage in self-improvement (Leath, 1991).

The EPSCOR Program is intended to provide some short-term grant assistance to states that traditionally receive smaller amounts of federal funding for research until they reach a certain benchmark of success in terms of their S&T capacity (Lambright, 1999). The program is not designed to essentially serve as an entitlement to be relied upon indefinitely by participating states (Lambright, 1999). The program is considered by many to be the most significant example in the post-World War II period of U.S. government-science relations focused upon increasing S&T capacity in less advantaged states and their major research universities (Lambright, 1999). The EPSOR Program is essentially described or characterized as a federal-state-university partnership to support research cluster activities in states historically receiving relatively less federal research funding (S.C. EPSCOR/IDEA Program, 2008). These various research cluster activities are supported by the program through a number of mechanisms such as implementation

12. Grants and laboratory partnership grants for individual investigation projects (S.C. EPSCOR/IDEA Program, 2008).

An assessment of the EPSCOR initiative reveals that the program, much to its credit, has clearly specified goals. The specific goals of the EPSCOR initiative at state levels is to increase collaborative research opportunities and activities among faculty at state four-year colleges, historically black colleges and universities (HBCUs), and state Ph.D granting research universities (S.C. EPSCOR/IDEA Program, 2008). These collaborative research endeavors through the EPSCOR initiative can be between academic and industrial researchers or just between academicians themselves (Hauger, 2004).

Further, the objective is to maximize the overall potential of a state's science and technology resources and in turn, use these resources as a foundation for economic growth and development (S.C. EPSCOR/IDEA Program, 2008). The function of a state's universities as it relates to regional and economic development is to allow their research strengths or advantages to be capitalized upon in order to meet strategic objectives of participating in a knowledge-based economy and ultimately attracting new businesses or industry to the region (S.C. EPSCOR/IDEA Program, 2008). In general, businesses or industry are attracted or drawn to areas where there are strong S&T oriented research universities to aid or assist them in areas such as research and development (R&D).

The focus of EPSCOR is essentially placed upon universities through its encouragement of collaborative research to improve states' S&T capacity and ultimately achieve regional economic growth and development (Lambright, 1999). The program's original intent was for the states themselves to take the primary responsibility in improving their capacity in science and

13. Technology (Lambright, 1999). In fact, state responsibility eventually became linked with components such as matching fund requirements (Lambright, 1999). In this instance, a match was expected principally from state governments (Lambright, 1999). The NSF's goal encompasses bringing individual states on board as partners (Lambright, 1999). In relation to the involvement of higher education institutions, most of the universities in less competitive states participating in the EPSCOR Program are public state-supported institutions (Lambright, 1999). The NSF's objective is to upgrade these universities, but through enhancement of state interest in science and technology leading to economic growth and development (Lambright, 1999).

It is evident from its origins that the EPSCOR Program is not a typical NSF grant program. For one, state level leadership is a critical component, and there is only one EPSCOR proposal from a given state (Lambright, 1999). This led to universities within respective states that may have been rivals cooperating in order to participate in the program (Lambright, 1999). Given that the EPSCOR initiative is essentially a state program, it selects prominent and highly influential leaders from academic, state government, and business communities to assure that a broad cross-section of state actors have involvement in the program (Lambright, 1999).

In assessing the EPSCOR initiative, it is important to recognize that initially, economic development was an emerging as opposed to a primary mission for the program (Hauger, 2004). The primary mission is to increase scientific research in various states through collaboration (Hauger, 2004). Beginning in the early 1990s, a key strategy for states attempting to increase their S&T capacity was developing a critical mass of researchers who would engage in collaborative research to sustain competitive research grants flowing into state research

14. Institutions (Hauger, 2004). The aim or objective became to develop statewide research clusters (Hauger, 2004). The significance of this development is that this extension of a critical mass if researchers from universities to state level through adopting the use of clusters signaled a shift toward a greater economic development perspective (Hauger, 2004). Moreover, the impetus for S&T based economic development initiatives that are found within states with economic development activities is more pronounced in some than in others (Hauger, 2004).

In the late 1990s, the NSF implemented a set of new guidelines for the EPSCOR Program designed to enhance the S&T capacity of U.S. states that lacked a strong research base (Mervis, 1997). While the program proved an opportunity for researchers within these states to basically compete for a small but protected pool of funds, the new rules introduced in the late 1990s offered certain financial incentives for researchers within these states to enter the NSF's national competition for potential funding (Mervis, 1997). With the initial NSF program, participating states could receive as much as $1.5 million per year in order to develop the necessary infrastructure they needed for science and to support research projects in critical areas considered important for scientific and economic growth for the state (Mervis, 1997).

The NSF made the decision to replace this initial arrangement with 3 year cooperative agreements (Mervis, 1997). With this new arrangement, a particular portion of the total program budget was essentially pooled with a comparable amount taken from NSF's regular research account (Mervis, 1997). This portion was about $10 million that was set aside for investigator grants (Mervis, 1997). This required scientists who had previously submitted their proposals for the smaller but protected pool of EPSCOR funds within their respective states to compete in a

15. Much stiffer national competition (Mervis, 1997). Those state scientists that received the best reviews ultimately received funding support from NSF's regular research directorates (Mervis, 1997). Further, the advantage of this new arrangement was that program managers had the capacity to stretch their budgets by utilizing the pool in order to fund half the cost of highly reviewed proposals from EPSCOR states (Mervis, 1997). Moreover, this arrangement was seen as a potential benefit for the states as they could possibly double their research funding (Mervis, 1997).

Through this new arrangement, NSF officials hoped that these changes would lead to scientists from EPSCOR states transitioning more quickly into mainstream funding (Mervis, 1997).

South Carolina's Involvement In EPSCOR

The state of South Carolina's Experimental Program to Stimulate Competitive Research (EPSCOR) and Institutional Development Awards (IDEA) are designed to leverage federal and state support to build South Carolina's research infrastructure (S.C. EPSCOR/IDEA Program, 2012). The program makes a concerted effort to infuse research into education (S.C. EPSCOR/IDEA Program, 2012). Given the program's concerns with the issue of access to science, technology, engineering and mathematics (STEM) related fields, South Carolina's EPSCOR/IDEA Program strives to provide opportunities for diverse groups of institutions, students, faculty, and disciplines in science and technology (S.C. EPSCOR/IDEA Program, 2012). Further, the state's program has an established goal of increasing collaboration among the key stakeholders of South Carolina's science and technology enterprise (S.C. EPSCOR/IDEA Program, 2012).

16. The South Carolina EPSCOR/IDEA Program also embraces the long-term goal of faculty enhancement for the state's colleges and universities (S.C. EPSCOR/IDEA Program, 2012). For example, since 1990, SC EPSCOR funds have essentially enabled the hiring of some 95 junior, tenure-track faculty members in science and technology at five of the state's colleges and universities (S.C. EPSCOR/IDEA Program, 2012). In terms of the state's higher education institutions that are targeted, South Carolina's EPSCOR/IDEA Program encourages collaborative and complementary research among the state's three Ph.D granting institutions (i.e. Clemson University, the Medical University of South Carolina, and the University of South Carolina) and predominantly undergraduate institutions (i.e. Furman University, Claflin University, the College of Charleston, Winthrop University, and South Carolina State University) (S.C. EPSCOR/IDEA Program, 2012). Both Claflin University and South Carolina State University are Historically Black Colleges and Universities (HBCUs) with South Carolina State University being the state's largest HBCU (S.C. EPSCOR/IDEA Program, 2012).

In relation to the issue of oversight, the state's program is basically monitored by several internal and external committees (S.C. EPSCOR/IDEA Program, 2012). For example, the South Carolina EPSCOR/IDEA State Committee is responsible for bringing together leaders from the state's higher education institutions that are involved in bringing into fruition program objectives (S.C. EPSCOR/IDEA Program, 2012). This state committee is entrusted with the responsibility of coordinating the initiatives across all EPSCOR and IDEA funded programs (S.C. EPSCOR/IDEA Program, 2012). The state committee serves as an advocacy group to increase leadership, participation from the private sector and interaction with the state's research and development stakeholders (S.C. EPSCOR/IDEA Program, 2012).

17. Another important committee is the IDEA Networks of Biomedical Research Excellence (INBRE) Steering Committee (S.C. EPSCOR/IDEA Program, 2012). This committee meets every six weeks and focuses upon making sure that the program's specific goals and achievements are consistent with the state INBRE program's strategic goals (S.C. EPSCOR/IDEA Program, 2012).

While EPSCOR Program funding is provided by six federal agencies, the state of South Carolina has eligibility for support from four of the federal agencies (S.C. EPSCOR/IDEA Program, 2012). First, the National Science Foundation (NSF) supports EPSCOR projects for the state of South Carolina through the Research Infrastructure Improvement Grant Program and Co-Funding (S.C. EPSCOR/IDEA Program, 2012). This particular program was proposed in 2009 to aid in building a statewide alliance in the area of tissue bio fabrication (S.C. EPSCOR/IDEA Program, 2012). This state alliance includes 10 of the state's major academic institutions such as "Claflin University, Clemson University, Denmark Technical College, Furman University, Greenville Technical College, the Medical University of South Carolina, South Carolina State University, the University of South Carolina, the University of South Carolina Beaufort, and Voorhees College" (S.C. EPSCOR/IDEA Program, 2012; p. 1).

This particular award expands a MUSC bioprinting program into a shared Advanced Tissue Bio fabrication Center that is statewide (S.C. EPSCOR/IDEA Program, 2012). It also promotes faculty enhancement for the state by recruiting some 22 new faculty across academic institutions to bring area expertise that is currently absent in the state (S.C. EPSCOR/IDEA Program, 2012). The award creates an e-community that is global and aids in facilitating the establishment of databases in vascular technology (S.C. EPSCOR/IDEA Program, 2012). It establishes academic

18. And industrial collaborations that are national and international in nature and integrates state initiatives for education, workforce development, and communication (S.C. EPSCOR/IDEA Program, 2012). Finally, this award engages in the integration of the alliance's biofabrication research with K-12 education with the long-term goal of building the state's high-tech workforce (S.C. EPSCOR/IDEA Program, 2012).

The issue of access is addressed as the award proposes new graduate degree, postdoctoral research, and graduate research training programs while also bridging the state's minority serving programs and integrating them with science, education, communication and sustainability plans (S.C. EPSCOR/IDEA Program, 2012).

The second agency that the state of South Carolina has eligibility for support from is the Department of Defense (S.C. EPSCOR/IDEA Program, 2012). For South Carolina, the Department of Defense Experimental Program to Stimulate Competitive Research (DEPSCOR) has been established to provide grants to support competitive research within the state concerning areas of interest related to defense (S.C. EPSCOR/IDEA Program, 2012). The third agency that South Carolina can receive support from is the Department of Energy (S.C. EPSCOR/IDEA Program, 2012). Within South Carolina, the Department of Energy Program to Stimulate Competitive Research (DOE EPSCOR) promotes infrastructure improvement in the state by supporting energy related research that is both nationally competitive and sustainable (S.C. EPSCOR/IDEA Program, 2012). Finally, the fourth agency South Carolina is eligible to receive support from is NASA (S.C. EPSCOR/IDEA Program, 2012). The National Aeronautics and Space Administration Experimental Program to Stimulate Competitive Research (NASA EPSCOR) for the state promotes its goals through the South Carolina Space Grant Consortium

19. Consisting of 13 academic institutions striving to create a more scientifically focused workforce within the state leading to greater economic prosperity (S.C. EPSCOR/IDEA Program, 2012).

Specific State Programs: South Carolina's INBRE Program

A specific state program in South Carolina stemming from EPSCOR efforts is South Carolina's INBRE Program (S.C. EPSCOR/IDEA Program, 2012). In terms of its program objectives, the goal of South Carolina's IDEA Networks of Biomedical Research Excellence (INBRE) Program is to increase the state's research capacity in the area of biomedical sciences (S.C. EPSCOR/IDEA Program, 2012). The SC INBRE Program also strives to provide program expansion and networking of research activities between faculty and students at higher education institutions across the state (S.C. EPSCOR/IDEA Program, 2012).

There are several key program strategies that are embraced by this state program. First, a key goal or strategy of the program is to increase access to this area of the sciences (S.C. EPSCOR/IDEA Program, 2012).The South Carolina INBRE Program seeks to provide access to resources for support of research activities at the state's higher education institutions (S.C. EPSCOR/IDEA Program, 2012). Further, it is committed to increasing the number of students particularly from underrepresented minority groups to pursue undergraduate and graduate students in the biomedical sciences (S.C. EPSCOR/IDEA Program, 2012). Second, the state's program is committed to providing both training and resources for the preparation of competitive grant proposals (S.C. EPSCOR/IDEA Program, 2012). A third goal or strategy for South Carolina's INBRE Program is to develop competitive grant programs to involve faculty and

20. Enhance productive interaction among the state's academic institutions of higher learning (S.C. EPSCOR/IDEA Program, 2012).

Conclusion: EPSCOR's Effectiveness as a Program

An overview of the EPSCOR reveals that there have been few studies done to evaluate EPSCOR as a program or even within individual states (Melkers & Wu, 2009). Those studies that have been conducted have taken more of a statewide macro-level approach (Melkers & Wu, 2009). In terms of overall program effectiveness, a comprehensive review of EPSCOR shows that the program has been a largely successful enterprise (D.G., 1983). For one, the program has increased public support within EPSCOR states such as South Carolina for science and has also increased the prestige and visibility of those receiving lucrative agency funding (D.G., 1983). Further, the program has resulted in new sources of support, better qualified graduate students, and advances in cutting edge research (D.G., 1983).

There have been studies done revealing important evidence of increased S&T capacity in EPSCOR states as a direct result of the program's efforts (Melkers & Wu, 2009). However, while studies indicate that the program has been effective in increasing federal R&D support for EPSCOR states resulting in an increase in their S&T capacity, the program has crowded out financial support for academic research from the governments of EPSCOR states (Wu, 2009). In short, some of the EPSCOR funds went to subsidize state budgets (Wu, 2009). Finally, the EPSCOR Program has been highly successful in assisting states such as South Carolina achieve

21. Faculty enhancement by increasing the number of quality faculty in STEM areas within the state's colleges and universities (S.C. EPSCOR/IDEA Program, 2012).

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