

Growing Our Economy

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College of Agriculture & Life Sciences, Texas A&M University



**AGRICULTURE
& LIFE SCIENCES**
TEXAS A&M UNIVERSITY



Subcommittee Report on Grand Challenge: Growing Our Economy

Subcommittee Members: Christine Alvarado, Ron Lacey, David Mattarita, Ed Rister, Gary Williams, Jennifer Williams; **Facilitator:** Alan Sams

Introduction


The earth's population is expected to grow by 28 percent from 7 to 9 billion people by 2050. This population growth is further expected to be accompanied by a rising level of purchasing power and standard of living for many of the developing nations' populations. This suggests that there will be substantial growth in per capita demand for existing products but also the creation and evolution of new markets for products and services. It is therefore projected that the 9 billion people will consume at the present day rate of 12 billion people, a 70% increase over today's needs.

However, this population growth and market expansion will occur against a backdrop of an ever-increasing, interconnected global dynamic. Economies shift with the speed-of-light electronic communication. The political and cultural winds of emerging and unstable nations create additional limitations and constraints, sometimes at odds with those of more affluent and powerful countries. The expanding populations and increasing rates of consumption will place even greater demands on the natural resources of land and water needed to supply the market and economic expansion. The workforce needed for this expanded production and consumption marketplace will require new developments in education, healthcare, public services, and civil infrastructure. Rural development and sustainability are already a focus of concern, but will face more pressure and may even also experience new opportunities in foreign, developing countries as rural enterprises evolve there.

Among the myriad of products and services and manufacturing systems, our College is uniquely positioned to lead in the innovation and implementation for food-, energy-, and health-related industries. While we are not producers of products or services, we can provide leadership to grow our economy through the innovation we create and the education we provide to students and our stakeholders throughout their lives. Our agricultural breadth and depth of expertise and facilities make us world leaders in many commodities and intellectual innovators in adapting to new challenges and needs. This intellectual capacity has allowed us to branch out in novel applications of our agricultural roots. Biofuels and renewable energy have been a natural application of our plant and biotechnological science and engineering expertise. Likewise, our molecular knowledge and biological focus position us as leaders in disease prevention, detection, and treatment as well as in regards to the impacts of disease on commerce and communities.

The Economic Landscape

Global Dynamics Impact Agricultural and Food Industry



Globalization, the growing openness and integration of world economies over the last 10-15 years, is forcing shifts in the allocation of world resources and in the pattern of world production and trade and creating new ways of doing business, new opportunities for growth, new problems to be resolved, and new issues and concerns for producers, processors, wholesalers, retailers, importers, exporters, government policy makers and all associated private and public sector groups. Finance, tax and investment policies in Texas, USA and elsewhere create a business environment that can foster or stagnate economic growth. In world commodity markets, the trend toward interdependent globalization is forcing dramatic changes in how agricultural commodities get transformed and delivered to consumers. Communication as well as wide-ranging investment and trade climates can be both helpful and hindering to economic growth. Traditional U.S. commodity supply chains, faced with new and increasing global competition, have sought to remain competitive through reductions in costs and increases in productivity at all levels, creating greater interdependence between the various stages in the food chain and forming strategic alliances, networks, and other linkages to improve logistics, product flow, and information flow. Because not all commodity systems are globalizing at the same rate or in the same way, globalization is having a differential effect on markets for agricultural commodities, energy, and other natural resources, leading to additional uncertainty as producers and businesses struggle to adjust to the rapidly-changing global conditions and systems.


Sustainability

-Environmental

Meeting the resource needs of this growing world economy will place additional stresses on our global environment. The demand for energy, water, and land will all increase concurrently with possible changes in the amount of these resources that are available. Such phenomena suggest new production systems will be needed that are more efficient at producing outputs from inputs. These systems could include higher-yielding and drought-tolerant plants, new processing methodologies for food that allow it to last longer or be more nutritious or new sources of energy. The increases in production volume and/or efficiency will need to be done in such a way as to not increase needs of other resources and without producing adverse effects on the environment. Protecting the environment will maintain the natural spaces for recreation and the human as well as economic benefits it brings.

-Rural

In the process of growing our economy, special attention must be placed on rural areas which often contain the natural resources from which we obtain our food, water and energy while at the same time providing the space in which we recreate and dispose of our waste. Rural areas contain much of our cultural heritage which is important to our identity and our future. Rural areas also represent a substantial economic potential in terms of business to support varied enterprises and resident populations. A specific advantage of rural areas is that best practices frequently recommend that critical functions like food supply and other sensitive activities be done in geographically-dispersed



locations for purposes of decentralization and to assure some level of isolation security. The large spaces needed to meet our food and other needs will further assure that rural locations are part of our future; thus, these areas need to be protected and supported in their unique ways. While critical for the growth of our economy, rural areas often lack economic diversity and adequate civil infrastructure, rely on a limited number of industries, and contain a less-educated population than their urban counterparts. Often, these attributes result in higher levels of underemployment and unemployment. In addition, such areas present higher rates of poverty, and higher incidences of malnutrition, disability, and mental disorders. Each of these characteristics limits the ability of rural citizens to secure jobs and/or promote investments necessary to promote economic growth and good quality of life opportunities. Thus, the process of rural sustainability requires a careful balance of truly understanding the importance of these places for society in the light of the constant vulnerability they experience. Sustainable growth requires providing rural environments and people with the necessary infrastructure, technology, economic resources, information, and educational resources that can allow for a responsible and informed extraction and usage of the multiple resources they provide.

Human Capital

Economic growth can only be achieved through an educated, healthy, and engaged/responsible population. Whether this population is in the USA or in another country, the interconnected global marketplace demands we consider the needs of all people. A vigorous and prosperous population of customers is as important as one of workers and producers. Human potential cannot be reached in a hungry population. More people die in the world from hunger and malnutrition than from HIV, tuberculosis, and malaria combined. Furthermore, the vast majority of hunger in the world is caused by poverty, not politics or war. Thus, a growing economy can reduce poverty which reduces hunger and makes for a stronger economy. Our College is a global leader and provides the education needed for all aspects of this growth from the science and technological innovation, engineering design, health and well-being, trade and policy, economics and business, and training of future generations. Broad cross-discipline education is imperative to prepare future generations to assimilate new technologies and successfully integrate them into local, regional, national, and international economies. Learning is a constant and lifelong necessity in our rapidly changing world. The mobility of people and information creates special challenges for delivering this continual learning, but also opportunities for the College to be the provider of it. Leadership, innovation, and entrepreneurship permeate all of our educational programs. It is through this knowledge and these programs that we can stimulate, inform, and sustain a growing global and domestic economy.

Outputs

Food

Globalization has changed the way we identify opportunities to grow our economy. Due to the oncoming population growth, the concern for future decades is food security, a term used to describe being able to safely, adequately, sustainably, and economically feed the global population while ensuring that local needs are met. With this concern of food security and our own national



security is also an opportunity to explore markets, people, and business opportunities previously inaccessible or unknown. New innovations and varieties of foods as well as cultural, functional, and nutritional aspects of food will all become increasingly important and can add value to create additional economic growth. Research in product development of new foods for cultures across the globe as well as providing highly nutritious foods to countries in need will become a critical driver for economic development. Innovative technologies and infrastructure to enhance and protect the safety, shelf stability, transportation, and year-round global distribution of foods will create borderless opportunities for all and will propel the development of business and economic growth.


Resources

Issues related to resources and growth ultimately come down to the question of how does an economy sustain growth in light of finite resources. There is a range of scenarios from a coming doomsday when we reach peak oil, peak phosphorus, or some other limit that results in the demise of mankind on one end and status quo, change the assumptions, dispute the data, or minimize concerns on the other. The scientific reality is probably in between, is more complex, and suffers from limited data as well as huge interconnected systems, which we do not currently understand. Chaos theory attempts to capture the scope of the problem as do studies into dynamic systems and sustainability.

Much of our traditional thinking deals with resource issues and the question of “How do we do more with less?” Resources are the core issue of all other areas of focus: Food, Water, Health, Global Dynamics, Sustainability, and Human Capital. Food production is limited by land or water or nitrogen or phosphorus or some other resource. Water is both a resource input for production and a necessary requirement for human life. Health is constrained by limited potable water or mosquito netting or medicine or some other resource. Global dynamics deals with prevailing differences in economies’ market power and the inequitable distribution of resources versus demand. Sustainability seeks to balance demand on resources with supply and human capital constrained by all of the above. The future also will need to consider the relatively poorly-understood interconnectedness of our global ecosystem as well as new, currently unknown resources and technologies that will change the current paradigm. We also should not consider resources as limited to what we currently have. Using synthetic biology to create new renewable energy forms or water alternatives are just two examples. Such game-changing opportunities will grow the economy by facilitating production and human well-being as well as by potentially creating new commodities and markets.

Health

Among the greatest growth potential and international need in the foreseeable future is the area of health. Whether it be in the areas of well-being and prevention or in diagnosis and treatment, our College is positioned to be a leader in research, teaching, and outreach. Included in this vision are humans, animals, and plants, and also the environment through the One Health Plus concept which interconnects these health systems. New knowledge, pharmaceuticals and treatments, vaccines, diagnostic tools, nutraceutical foods, lifestyle programs, and pest management are all areas in which



we are leaders with competitive advantage. These health technologies and programs, as well as the economics and policies guiding them, also play a major role in growing our economy through their critical role in international trade and travel. Preventing the spread of plant, animal, and human diseases are a key goal of many governmental and international policies. Our innovations as well as both educational and outreach programs are critical opportunities for us to stay compliant, inform decision makers on such policies, and keep our human, animal and plant populations healthy. A healthier population grows the economy through healthcare savings as well as productivity increases.

Experiences and Education


Not all outputs that contribute to economic growth are tangible. The pleasure and physical benefits one realizes from leisure activities and the personal or professional growth one obtains from learning are intangible gains for which people and society are willing to pay and support. Tourism is a multibillion dollar, world-wide industry focused on serving this need. Other, non-tourism leisure activities are quite varied, but are likewise important contributors to economic and human capital development and are often dependent on the environment. Education is a set of experiences, knowledge, and abilities that, in an intangible way, improve one's marketability, increase the productivity of their employer, or simply bring a sense of accomplishment. These products all grow the economy or at least improve human capital. In addition to the intangible nature of education as an output, the curriculum and materials that provide the learning are more tangible elements that can contribute to the economy.

Outcomes and Goals

1. Achieve a Title VI grant from the Department of Education (or similar, non-traditional grant) on growth of the economy through technological and human capital innovations in food/natural resource policy and trade.
2. Foster more public/private funding relationships. In particular, work with major foundations to obtain a major (\$10-30M) grant to fund a/some program(s) that address large, complex problems of economic significance such as water, hunger, or international trade. This recognizes that our College's role in sustainable economic growth will depend on expanding (a) our funding base beyond federal grants, state appropriations, and industry contracts, and (b) our view of stakeholders beyond agriculture to include the many other industries and clientele we serve.

Strategic Needs to Accomplish Outcomes and Goals

1. Foster interdisciplinary networks and activities between faculty. Although such an integrated team approach is needed in many areas and many ways, one example is to create a program for "incubator sabbaticals" in which faculty from differing backgrounds are co-located for 9-12 months (on campus) to address a mutually interesting, but interdisciplinary issue/theme. Team seed grants to support collaboration and interdisciplinary initiatives would be another, similar approach.

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2. Deeper faculty expertise and additional educational programs (courses) are needed in international trade and international development
 3. Establish a focus on Latin America to better capitalize on our extreme competitive advantage there. These efforts could include many components such as faculty networking, funding for activities in teaching and research, as well as administrative facilitation.
 4. Research facilitation in team assembly and facilitation as well as proposal development and management.
 5. Develop better understanding among faculty and students regarding (a) the interrelatedness of value chains; (b) the business and economic aspects of technology development, adoption, and implementation; and (c) the legislative and other institutional attributes appropriate for enhancing the sustainable success of entrepreneurial ventures.
 6. Establish a small business “incubator” or problem-solving consultancy mechanism that fosters creative and collaborative relationships between entrepreneurs and innovative faculty.
 7. Optimize TAMUS policies and services regarding intellectual property to better foster innovation and external partnerships.
 8. Capitalize on our brand strength and former student network in promoting our interdisciplinary problem-solving capacity/expertise through such venues as a website directory. A similar effort can promote our lifelong-learning opportunities (personal/professional continuing education).