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Szent István Egyetem

2103 Gödöllő, Páter Károly u. 1.

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Foreword

Tradition and Innovation – International Scientific Conference of (Agricultural) Economists

Szent István University, Gödöllő, 3-4 December, 2007

Tradition and Innovation – International Scientific Conference was held on December 3-6, 2007, in the frames of the anniversary programme series organized by the School of Economics and Social Sciences of the Szent István University. The aim of the conference was to celebrate the 50th anniversary of introduction of agricultural economist training in Gödöllő, and the 20th anniversary of the School of Economics and Social Sciences, which was founded in 1987.

The articles published in the special edition of Bulletin 2008 of the Szent István University were selected from the 143 presentations held in 17 sections of the conference and 30 presentations held at the poster section. The presentations give a very good review of questions of national and international agricultural economics, rural development, sustainability and competitiveness, as well as the main fields of sales, innovation, knowledge management and finance. The chairmen of the sections were Hungarian and foreign researchers of high reputation. The conference was a worthy sequel of conference series started at the School of Economics and Social Sciences in the 1990s.

Előszó

Tradíció és Innováció – Nemzetközi Tudományos (Agrár)közgazdász Konferencia Szent István Egyetem, Gödöllő, 2007. december 3-4.

2007. december 3-6. között a Szent István Egyetem Gazdaság- és Társadalomtudományi Kara (SZIE GTK) által szervezett jubileumi rendezvénysorozat keretében került megrendezésre a Tradíció és Innováció – Nemzetközi Tudományos Konferencia, amelynek célja volt, hogy méltón megünnepelje a gödöllői agrárközgazdász képzés fél évszázada történet elindítását, s ugyanakkor a Gazdaság- és Társadalomtudományi Kar 1987-ben történt megalapításának 20. évfordulóját.

A Szent István Egyetem által kiadott Bulletin 2008 évi különszámában megjelentetett cikkek a konferencián 17 szekcióban elhangzott 143 előadásból, illetve a poszter szekcióban bemutatott 30 előadásból kerültek kiválasztásra. Az előadások jó áttekintést adtak a hazai és nemzetközi agrárközgazdaság, vidékfejlesztés, a fenntarthatóság és versenyképesség kérdései mellett az értékesítés, innováció, tudásmenedzsment, pénzügy fontosabb területeiről is. Az egyes szekciók elnöki tisztjét elismert hazai és külföldi kutatók töltötték be. A konferencia a Gazdaság- és Társadalomtudományi Karon az 1990-es években elkezdett konferencia sorozat méltó folytatása volt.

Dr. László Villányi
Dean / dékán

Contents / Tartalomjegyzék

Part I. / I. kötet

Agricultural and rural development and international view

Agrár- és vidékfejlesztés, nemzetközi kitekintés

ÁCS, SZ. – DALLIMER, M. – HANLEY, N. – ARMSWORTH, P.: Impacts of policy reform on hill farm incomes in UK.....	11
BIELIK, P. – RAJČÁNIOVÁ, M.: Some problems of social and economic development of agriculture.....	25
BORZÁN A. – SZIGETI C.: A Duna-Körös-Maros-Tisza Euro régió gazdasági fejlettségének elemzése a régiók Európájában.....	37
CSEH PAPP, I. Regionális különbségek a magyar munkaerőpiacon.....	45
NAGY, H. – KÁPOSZTA, J.: Convergence criteria and their fulfilment by the countries outside the Euro-zone.....	53
OSZTROGONÁ CZ, I. – SING, M. K.: The development of the agricultural sector in the rural areas of the Visegrad countries.....	65
PRZYGODZKA, R.: Tradition or innovation – which approach is better in rural development? The case of Podlasie Region.....	75
TAKÁCS E. – HUZDIK K.: A magyarországi immigráció trendjei az elmúlt két évtizedben.....	87
TÓTHNÉ LŐKÖS K. – BEDÉNÉ SZŐKE É. – GÁBRIELNÉ TŐZSÉR GY.: országok összehasonlítása néhány makroökonómiai mutató alapján.....	101
VINCZE M. – MADARAS SZ. Analysis of the Romanian agriculture in the period of transition, based on the national accounts.....	111

Agricultural trade and marketing

Agrárkereskedelem, marketing

ADAMOWICZ, M.: Consumer behavior in innovation adaptation process on fruit market.....	125
FÉNYES, T. I. – MEYER, N. G. – BREITENBACH, M. C.: Agricultural export and import assessment and the trade, development and co-operation agreement between South Africa and the European Union.....	137
KEMÉNYNÉ HORVÁTH ZS.: The transformation of market players on the demand-side of the grain market.....	151
LEHOTA J. – KOMÁROMI N.: A feldolgozott funkcionális élelmiszerek fogyasztói szegmentálása és magatartási jellemzői.....	159
LEHOTA J. – KOMÁROMI N.: Szarvasgomba fogyasztói és beszerzési magatartásának szegmentálása és jellemzői.....	169
NYÁRS, L. – VIZVÁRI, B.: On the supply function of the Hungarian pork market.....	177
SZAKÁLY Z. – SZIGETI O. – SZENTE V.: Fogyasztói attitűdök táplálkozási előnyökkel kapcsolatban.....	187
SZIGETI O. – SZENTE V. – MÁTHÉ A. – SZAKÁLY Z.: Marketing lehetőségek az állati eredetű hungarikumok termékpályáján.....	199
VÁRADI K.: Társadalmi változások és a marketing kapcsolatának modellezési lehetőségei.....	211

Sustainability and competitiveness
Fenntarthatóság, versenyképesség

BARANYAI ZS. – TAKÁCS I.: A hatékonyság és versenyképesség főbb kérdései a dél-alföldi térség gazdaságaiban.....	225
BARKASZI L.: A kukoricatermesztés hatékonyságának és eredményességének vizsgálata 2003-2006 évi tesztüzemi adatok alapján	237
JÁMBOR A.: A versenyképesség elmélete és gyakorlata	249
LENCSE E.: A precíziós gazdálkodás ökonómiai értékelése.....	261
MAGÓ, L.: Low cost mechanisation of small and medium size plant production farms	273
SINGH, M. K. – KAPUSZTA, Á. – FEKETE-FARKAS, M.: Analyzing agriculture productivity indicators and impact of climate change on CEECs agriculture	287
STRELECEK, F. – ZDENĚK, R. – LOSOSOVÁ, J.: Influence of farm milk prices on profitability and long-term assets efficiency	297
SZÉLES I.: Vidéki versenyképesség-versenyképes vidékfejlesztés: AVOP intézkedések és azok kommunikációjának vizsgálata.....	303
SZŐLLŐSI L. – NÁBRÁDI A.: A magyar baromfi ágazat aktuális problémái.....	315
TAKÁCS I. – BARANYAI ZS. – TAKÁCS E. – TAKÁCSNÉ GYÖRGY K.: A versenyképes virtuális (nagy)üzem	327
TAKÁCSNÉ GYÖRGY K. – TAKÁCS E. – TAKÁCS I.: Az agrárgazdaság fenntarthatóságának mikro- és makrogazdasági dilemmái	341
Authors' index / Névjegyzék.....	355

Part II. / II. kötet

Economic methods and models

Közgazdasági módszerek, modellek

BARANYI A. – SZÉLES ZS.: A hazai lakosság megtakarítási hajlandóságának vizsgálata	367
BHARTI, N.: Offshore outsourcing (OO) in India's ites: how effective it is in data protection?	379
BORSZÉKI É.: A jövedelmezőség és a tőkeszerkezet összefüggései a vállalkozásoknál	391
FERTŐ, I.: Comparative advantage and trade competitiveness in Hungarian agriculture	403
JÁRÁSI É. ZS.: Az ökológiai módon művelt termőterületek nagyságát befolyásoló tényezők és az árutermelő növények piaci pozíciói Magyarországon	413
KODENKO J. – BARANYAI ZS. – TAKÁCS I.: Magyarország és Oroszország agrárstruktúrájának változása az 1990-es évektől napjainkig	421
OROVA, I. – KOMÁROMI, N.: Model applications for the spread of new products in Hungarian market circumstances	433
REKE B.: A vállalkozások egyensúlyi helyzetének változáskövető vizsgálata	445
ŠINDELÁŘ, J.: Forecasting models in management	453
SIPOS N.: A környezetvédelmi jellegű adók vizsgálata a fenntartható gazdálkodás vonatkozásában	463
VARGA T.: Kényszerű „hagyomány”: értékvesztés a mezőgazdasági termékek piacán	475
ZÉMAN Z. – TÓTH M. – BÁRCZI J.: Az ellenőrzési tevékenység kialakítási folyamatának modellezése különös tekintettel a gazdálkodási tevékenységeket érintő K+F és innovációk elszámolására	485

Land utilization and farm structure

Földhasználat, gazdaságstruktúra

FEHÉR, I. – MADARÁSZ I.: Hungarian land ownership patterns and possible future solutions according to the stakeholders' view	495
FEKETE-FARKAS, M. – SINGH, M. K. – ROUNSEVELL, M. – AUDSLEY, E.: Dynamics of changes in agricultural land use arising from climate, policy and socio-economic pressures in Europe	505
LAZÍKOVÁ, J. – BANDLEROVA, A. – SCHWARCZ, P.: Agricultural cooperatives and their development after the transformation	515
ORLOVITS, ZS.: The influence of the legal background on the transaction costs on the land market in Hungary	525
SADOWSKI, A.: Polish land market before and after transition	531
SZÚCS, I. – FARKAS-FEKETE M. – VINOGRADOV, S. A.: A new methodology for the estimation of land value	539

Innovation, education
Innováció, tudásmenedzsment

BAHATTIN, C. – PARSEKER, Z. – AKPINAR BAYIZIT, A. – TURHAN, S.: Using e-commerce as an information technique in agri-food industry.....	553
DEÁKY Z. – MOLNÁR M.: A gödöllői falukutató hagyományok: múlt és jelen.....	563
ENDER, J. – MIKÁCSÓ, A.: The benefits of a farm food safety system.....	575
FARKAS, T. – KOLTA, D: The European identity and citizenship of the university students in Gödöllő.....	585
FLORKOWSKI, W. J.: Opportunities for innovation through interdisciplinary research ...	597
HUSTI I.: A hazai agrárinnováció lehetőségei és feladatai	605
KEREKES K.: A Kolozs megyei Vidéki Magyar fiatalok pályaválasztása.....	617
SINGH, R. – MISHRA, J. K. – SINGH, M. K.: The entrepreneurship model of business education: building knowledge economy	629
RITTER K.: Agrár-munkanélküliség és a területi egyenlőtlenségek Magyarországon.....	639
SZALAY ZS. G.: A menedzsment információs rendszerek költség-haszon elemzése	653
SZÉKELY CS.: A mezőgazdasági vállalati gazdaságtan fél évszázados fejlődése.....	665
SZÚCS I. – JÁRÁSI É. ZS. – KÉSMÁRKI-GALLY SZ.: A kutatási eredmények sorsa és haszna	679
Authors' index / Névjegyzék.....	689

OPPORTUNITIES FOR INNOVATION THROUGH INTERDISCIPLINARY RESEARCH

FLORKOWSKI, WOJCIECH J.

Abstract

The need for the multidisciplinary research collaboration results from the needs of modern economy. Cutting-edge-research is increasingly multidisciplinary and requires experts to bring disciplinary knowledge, but willing and able to share knowledge and experience in the search for comprehensive solutions. Individual efforts can become more efficient if the institutional structures promote unimpeded exchange of knowledge through informal and formal arrangements. Agricultural and applied economists can assume the leadership position in multidisciplinary research projects by identifying the researchable issue and guiding the search for solutions given preferences and attitudes of users. Universities that do not innovate and encourage multidisciplinary research and teaching collaboration will become providers of basic, disciplinary teaching.

Keywords: multidisciplinary research collaboration, institutional promotion, attitudes of researchers

Introduction

Generation of knowledge is associated with the creation of value. Economists, including agricultural economists, have been supplying new knowledge through theoretical and applied research. Knowledge is supplied in response to demand for recommendations and solutions of practical problems encountered by firms, households and governments. A large number of agricultural economists in the United States work in academe. Their primary output is the transfer of knowledge through teaching. Responsibilities also include research. The research typically occurs within the disciplinary boundaries and is predetermined by the availability of data in the form suitable of economic research. In their approach to research, agricultural economists (or economists) apply disciplinary approach. Consequently, the users of research results receive recommendations based on the perspective of a single discipline. Knowledge users are largely left alone to understand the interconnections and dependence among disciplinary solutions to a particular problem and must take the full risk of arriving at a decision, which, in real life, often has implications beyond the ability of a single discipline to predict most likely outcomes.

This paper describes motives and requirements for an effective multidisciplinary collaboration. Multidisciplinary research (the words ‘multidisciplinary’ and ‘interdisciplinary’ are use interchangeably in this paper) collaboration is an alternative to the disciplinary approach. It attempts to examine an issue and offer solutions after accounting for the multifaceted nature of empirical problems, especially those involving human behavior. Solutions obtained through multidisciplinary collaboration have been developed after the consideration of a variety of perspectives. Such consideration assures a more comprehensive solution than a single discipline could offer although not all problems can be addressed through multidisciplinary research. However, despite the efficiency of the multidisciplinary research in achieving solutions, studies of research collaboration in academe involving economists or agricultural economists are relatively infrequent. In contrast, there is a rich literature of collaboration across specialties and innovation in industry other segments of the

economy. Some results from those studies offer insights into human behavior applicable in academic setting.

What motivates the multidisciplinary research collaboration?

Increasing interconnectedness of today's economies creates complex problems that cannot be effectively tackled through disciplinary research. The search for solutions for complex problems requires accurate identification and an evaluation of solutions. Knowledge generation has become an industry and its presence and strength are ever more important for the sustainable economic growth. Biotechnology and its numerous applications are dramatic illustrations of the area poised for growth, yet based on research progress in multiple scientific fields, while a new field of systems biology integrates research in biology, engineering and computer science [Tadmor and Tidor, 2005]. The co-dependence across economic sectors results in less distinguishable boundaries between different areas. Although poorly defined boundaries can result in a conflict, the exchange of knowledge across disciplines stimulates innovation. The research in all disciplines progresses at a very high rate leading to two tendencies: either to become increasingly narrow disciplinary research, or to innovate through learning about other disciplines, their research tools, procedures and outcomes engaging in common research projects. The latter requires a researcher prepared and suited to work with other disciplines [Tadmor and Tidor, 2005].

Innovation is a major driving force behind the multidisciplinary research in university setting. Monetary rewards to multidisciplinary teams are rare. At the United States land-grant university, the reward structure is centered on individual effort and disciplinary career path. Despite the lip service paid to the benefits of the multidisciplinary research, there is substantial resistance to create structures to facilitate the interaction of researchers. A new structure changes the established pattern of allocating resources which follow institutional arrangements based on disciplines.

Attempts create the interdisciplinary mindset

Interdisciplinary research collaboration depends on expertise acquired from individual disciplines [Coppola et al., 2007]. The need for disciplinary expertise, among others to teach introductory courses at American universities, will continue. To bridge the gap between disciplinary teaching and interdisciplinary research requires commitment and effort of faculty. A practical approach to reduce the gap is dual mentoring of new faculty or post-doctoral associates that involves a mentor in the area of teaching a disciplinary course and mentoring when working on interdisciplinary research project. These efforts must be supplemented through the use of traditional tools, e.g., brown bag lunch panel discussions, but the fundamental difference rests in the choice of topics and the involvement of more experienced faculty in the Department willing and readily sharing their experience with the younger colleagues.

Interdisciplinary research is not risk free if the progress of the project influences the promotion and tenure. For an agricultural or applied economist getting involved in the interdisciplinary work is often problematic. Whereas the biological scientists can share the interest in a particular pest attacking a particular plant, for example, what would be the role of agricultural economist is often not obvious. There is possibly a role of offering economist's services in estimating benefits of the applied solution, but such contribution seldom survive a peer-review if report is submitted to an economic/agricultural economic journal. Moreover,

despite the lip service paid by many leading agricultural economists to the interdisciplinary (or multidisciplinary research; the terms are understood as interchangeable in this paper), the actual evaluations of such work insist on strict disciplinary criteria and ignore any interdisciplinary contributions.

The willingness of faculty to engage in the interdisciplinary research project can be accomplished if the members of the Department or the interdisciplinary project think as a team. Outside academe, some firms establish heterogeneous teams to encourage innovative thinking [Mellp and Ruckers, 2006]. A team has a variety of information sources and if opinions can be openly expressed, the solutions offered to problems should outperform solutions of disciplinary (homogeneous) units. Teams have been found to behave in an economically rational way [Rockenbach et al., 2007]. However, the prerequisite for the success of heterogeneous, or interdisciplinary, teams is the commonality of the goal. Individuals' background is related to preferences and different backgrounds result in different preferences. Unless the preferences for a specific outcome are not shared by all team members, the performance of an interdisciplinary team may be worse than the work of individuals along the disciplinary boundaries.

Innovation requires an exchange of knowledge, but the disciplinary approach restricts the flow of information and limits cross-disciplinary interactions. The flow of knowledge results from informal interactions as noted by Tadmor and Tidor [2005] and fills the awareness gap about other's teaching and research. Moreover, in the absence of interaction the available, often sophisticated equipment, is underutilized. Shared facilities lower the cost of research, while encouraging the exchange of information and knowledge across disciplines. If the informal and formal interactions do not stimulate interdisciplinary collaboration in teaching and research, then there exist institutional arrangements that reward isolated, disciplinary effort, limit transparency, and discourage knowledge sharing. In economic sense, such institutions replace competition based on access and inclusion by monopolistic behavior rewarding the denial of information and exclusion. Such attitudes within universities are rooted in the culture of disciplinary approach in the environment of resource scarcity where rewards and losses represent a zero sum game.

What is the role of agricultural economists in the multidisciplinary research?

Agricultural economists either lead a project or contribute their professional services to research emphasizing the importance of a different discipline. In their leading role, agricultural (applied) economists identify an issue, organize a team of disciplinary experts, and guide and coordinate the search for solutions. Examples of projects where agricultural economist's leading role is suitable include rural development, poverty alleviation, product development, technology development and transfer, etc.

The role of agricultural economist as a contributor to a project led by other disciplines often implies the need to identify the likely costs and possible monetary gains from the proposed solution. For example, projects in biological sciences change established production practices. The change is costly in itself. Moreover, new recommendations may require purchase of additional or new inputs or demand an investment into new equipment, or an adaptation of the existing equipment to perform new tasks. Sometimes, biological scientists calculate costs or monetary benefits without the direct involvement of an agricultural economist, but the simplified calculations may result in biased estimates. Often, the estimates ignore the cost of learning a new practice assuming it can be performed at the desired level instantly.

Agricultural economists with farm management, finance or accounting expertise, who are involved from the onset of a research project help to guide it towards economically viable solutions. Still, too often the advice of an economist is sought after the project was completed to assist in demonstrating the value of the identified solution.

In the traditional disciplinary setting, agricultural economists are likely to offer services in assessing the costs or marketing viability of solutions developed by other disciplines. The multidisciplinary collaboration offers a leading role to applied or agricultural economist. An economist can easily identify a need for a solution by considering policy needs, e.g., the protection of food safety, or consumer needs, e.g., preferences for food with specific attributes, which can be achieved through genetic manipulation such as the vaccine delivery in food. Economists as modelers of human decision making process and selection determined by the budget constraint are able to provide guidance in the early stages of research to search for a solution that is acceptable to the endusers. Knowledge of attitudes and perceptions influencing market choices allows applied economists to reduce the risk of misallocating research capacity towards products that do not meet consumer expectations. However, to assume the leadership role, the existing structures must facilitate interaction of researchers from various disciplines.

How to initiate a research project with other disciplines?

First, it takes an initiative to contact researchers in other fields and identify a topic of mutual interest. Unless there is a mutual interest in addressing an issue, a interdisciplinary effort will not be undertaken. Second, the researcher reaching out across disciplines must take an effort to communicate. Communication with scientists in other disciplines is time consuming because despite dealing with highly educated individuals, the terminology and professional jargon of each discipline is different. Only after clarifying the meanings of what may seem as the simple and obvious can researchers engage in the common investigation. Third, interdisciplinary research implies taking the risk of investing in a venture with an unknown short run payoff. Among the rewards expected by researchers from different disciplines are peer-reviewed publications and research grants.

In a university setting, a faculty member is expected to demonstrate disciplinary skills, yet the cutting edge science is increasingly complex and interdisciplinary in nature. For a university, college or department to achieve the leading position in research, scientists must be encouraged and rewarded for interdisciplinary work. This approach shifts the burden of recognizing the value of the multidisciplinary approach to university administrators. Without their active involvement, ability to assess the value of interdisciplinary work, and the contribution of individual team members, the interdisciplinary approach is unsustainable. It is, then, only a matter of time that institutions that fail to restructure expand their mission and objectives, and support the interdisciplinary research will slip and rapidly become obsolete. Such institutions in order to continue their existence will offer teaching of introductory courses and outreach services of similar caliber.

The key role of university administrators as managers of human resources accumulated to generate new knowledge cannot be underestimated. The risk of undertaking an interdisciplinary research project is exacerbated by the reward structure. Despite statements in favor of multidisciplinary research, the rigid institutional structure in the American university system is disciplinary. Driven by apathy and serving the convenience of administrators and the bureaucratic structures, little has been done to foster multidisciplinary research. Rather

than seek innovative institutional arrangements, academic administrators squabble over resources, from office space to staff positions. However, alternative forms of organizing research exist. For example, in some research institutions team of multidisciplinary experts are formed to tackle specific practical problems. The research unit carries the name of an issue or a concept rather than reflect a single discipline.

How to work on a multidisciplinary research projects?

Once the objectives of the project have been identified and agreed upon, the members of a multidisciplinary team take the leading role according to the sequence dictated by the search for a solution. At various project stages, a different type of expertise may be required and the team member with the appropriate skills coordinates the research effort. Once the stage of the project was completed, the team moves to the next stage and, likely, a researcher with another type of disciplinary expertise takes over. A surgery would not be a success if the anesthesiologist and a surgeon ignored the sequence in which they work.

The sequential process has been applied successfully in product development in food manufacturing. From product identification through formulation to packaging and distribution different expertise is required and must be applied to reduce the risk of product failure. Within academe, the incentives for collaborative research across disciplines are weak, although the failure of such research still has the value because it increases the experience, generates knowledge useful in teaching and new research projects. However, the value of knowledge gained from failure is typically ignored by evaluators.

The sequential leadership of a project is not explicitly practiced for a number of reasons. Among the reasons not controlled in a university setting may be the nature of the relationship between a university-based interdisciplinary team and the funding agency. From the accounting standpoint, the less frequent changes in the principal investigator position, the easier it is to maintain continuity of the project.

Examples of interdisciplinary collaboration

The search for engines behind economic growth is reflected in the proposed new economic theory of the new knowledge economy. The emerging theory views technological changes as endogenous [Aerni, 2007]. Intangible assets including human capital and knowledge drive economic development. The Cassava Biotechnology Network (CBN) illustrates how agricultural biotechnology and information technology. The interdisciplinary effort improves the productivity and nutritional quality of cassava, a staple of millions living in the tropics.

Precision agriculture, a technology already available to farmers required collaboration of weed scientists, agricultural engineers, economists, irrigation specialists and computer experts. The result of precision agriculture use leads to less application of pesticides, targeted application of irrigation water, and productivity improvements. Reports from experimental applications of precision agriculture to weed control involved agricultural engineers and economists, but required also botanical expertise to distinguish among plants in the fields [Takácsné-György and Barkaszi, 2006]. Although costly at current output prices, the economic viability of precision agriculture will change as the prices of agricultural commodities increase. Similarly, in the area of economic evaluation of specialized machinery organizations on capital efficiency, economists, engineers, and management experts cooperate

to find solutions that reduce production costs by increasing the utilization of available capacity (Takács – Baranyai, 2005).

The interdisciplinary journals have an unpredictable life expectancy. For example, the Journal of Production Agriculture ceased to exist after a period of years although it attracted a variety of papers from different disciplines. In some instances, journals that depend on interdisciplinary submissions alter their disciplinary orientation. On occasion, they are plagued by changes in editorial leadership resulting in delays in review causing the journal's demise. It appears that interdisciplinary journals with the focus on cutting edge science have performed well. It is the applied journals that offer to publish articles from several disciplines that are more likely to face difficulties. In part, perhaps, this is a result of papers, which still originate primarily from the disciplinary research and reach the audience that discounts research results from all, except their own, disciplines.

Concluding remarks

Multidisciplinary research collaboration results from the increasing complexity of practical problems. The multiple information sources and experience brought about by experts from various disciplines create conditions for finding solutions that account for a variety of perspectives and, therefore, fit the real world applications. A number of emerging science fields involves multiple disciplines and requires their interaction to progress. Agricultural or applied economists can contribute to the development of new knowledge and solutions through leadership in the identification of restricting economic growth and sharing their knowledge of preferences and attitudes for the nature of possible solutions that will be accepted and, eventually, adopted.

The existing university structures often restrict the open interaction across disciplines needed for the multidisciplinary collaboration. Indeed, administrators have incentives to maintain the disciplinary structures because of the ease of resource allocation. Moreover, the reward structure based on disciplinary approach promotes lack of transparency and exclusion. The short term nature of the institutional behavior is further emphasized by the tenure and promotion procedures. Young academics are encouraged to retain disciplinary focus and may never develop the desire to engage in the interdisciplinary research. Universities that will ignore the multidisciplinary collaboration will limit their participation in the cutting edge research, weaken their ability to attract the best quality students, and forfeit the value of generation of new knowledge.

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Author

Wojciech J. Florkowski, Ph.D., Professor
University of Georgia
Wojciech@uga.edu

