New Frontiers in Regional Science: Asian Perspectives 42

Zhenhua Chen
William M. Bowen
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Development Studies in Regional Science

Essays in Honor of Kingsley E. Haynes

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New Frontiers in Regional Science: Asian Perspectives

Volume 42

New Frontiers in Regional Science: Asian Perspectives

This series is a constellation of works by scholars in the field of regional science and in related disciplines specifically focusing on dynamism in Asia.

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Endorsement

Kingsley Haynes is a wise and insightful leader of the field of regional economics. He has contributed significantly to research, policy making, and the creation of enduring academic institutions. This book is a fitting tribute by his friends and students that combines rich scholarship and much gratitude for all that Kingsley has accomplished. It is full of sparkling essays that capture the range of areas in which Kingsley has left his mark.

Harvard University
Cambridge, MA, USA

Edward Glaeser

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Chapter 1
Introduction

William M. Bowen, Zhenhua Chen, and Dale Whittington

Abstract This chapter introduces and describes several selected aspects of Professor Kingsley E. Haynes' background and orientation. These include his many academic accomplishments, deeply thoughtful scientific perspectives, and tremendous personal relationships with numerous students and colleagues. It gives an overview of each of the chapters and describes their organization throughout the book.

Keywords Extraordinary record of research and scholarship · Administrative appointments · Perspectives and impacts on regional science · Influence on students and colleagues · Overview of chapters in book

The Festschrift is a largely European academic tradition in which the contributions of an eminent scholar are honored and celebrated by colleagues who contribute original works to a volume dedicated to that scholar. Festschrifts are usually oriented around a prominent theme in the honoree's work and are usually written toward the end of the honoree's career. In this case, the honoree is Kingsley E. Haynes, and the theme is development studies in regional science.

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The challenge of reducing Kingsley Haynes' wide-ranging body of extraordinary scholarship to this one theme was daunting. For nearly 50 years, Kingsley has tirelessly dedicated himself to building and advancing knowledge in applied geography and regional science. He has worked and published widely not only in development studies but also in areas including transportation and telecommunication infrastructure investment, regional economic development, and analytic modeling for decision support. He has been an active participant and source of financial support for a wide range of conferences. He has engaged in one way or another with an exceptionally large number of students, including the three of us, challenging us and encouraging us to prepare research for presentation at conferences. When his students have successfully risen to his challenges, he has sent them to the conferences to present. In this way he has formed bonds and maintained his relationships with his students for years after graduation and on in to our professional and academic lives. In this and other ways, thankfully, he has developed such a large number of devoted students, colleagues, and friends that the task of finding willing contributors to a volume honoring him and his work turned out to be surprisingly easy.

Kingsley began to develop an interest in geography starting in his high school years in Canada (Haynes 2007). From there, his odyssey as a student unfolded from Western Michigan University, to Rutgers University, to Johns Hopkins University where he learned geographical and regional scientific theory, analytic methods, and statistics, and he learned to apply them, first in predicting migration behavior and spatial interaction. As a Ph.D. student, he studied economics, demography, sociology, operations research, as well as game theory and neural networks. This multidisciplinary academic background led to a lifelong interest in transportation and urban development patterns. He worked in the Middle East as the Director of the Ford Foundation's Office of Resources and Environment. While there he focused his research upon the management of the Nile River, the development of operating rules for the Aswan High Dam, capacity building in water quality monitoring and management, and assessment of the Jonglei Canal project in the southern Sudan. By the time he returned to the United States, he had started his career-long characteristic behavior pattern of seeking and securing academic and governmental grants on one hand and at the same time using the resources from those grants to work on a wide range of applied problems, such as simulation models for airport design, airport development, university location decisions, and the regional effects of school district consolidation on the other. He developed interests in energy and pollution management through his research in the Ohio River Basin and energy expansion and water resource management in the Yellowstone Basis. He developed expertise in environmental analysis, infrastructure, investment and financing, decision support, GIS, public management, and public policy. Throughout his research and applied activities in these many areas, he has always kept a core focus upon the interaction of theory and practice within the context of real-world problem-solving.

To say that Kingsley's contribution to research and scholarship has been extraordinary is, in many respects, an understatement. In the course of his career, he has held faculty and various administrative appointments at McGill University, the University of Texas, Indiana University, Boston University, and George Mason University. In 1990, after serving as the Chair of the Department of Geography at

Boston University, he became the founding Director of the Institute of Public Policy at George Mason University. In 2000, after having grown the Institute into a School of Public Policy, he became the Founding Dean. He then led the young School's growth to the point of having over 75 faculty members, 150 PhD students, and 850 MA students in five programs, with a total of 350 staff members. For his many accomplishments, he has earned numerous honors and awards including the James R. Anderson Medal for Applied Research in Geography, the North American Regional Science Conferences' Boyce Distinguished Service Award, Fellow of the Regional Science Association International, and Fellow of the National Academy of Public Administration. Along the way he has been the principal investigator, co-principal investigator, or researcher on approximately 90 grants and contracts worth over $66,000,000.00 from sources such as the National Science Foundation, the National Atmospheric and Space Administration, and the US Departments of Transportation, Defense, Energy, and State. And he published over 220 peer-reviewed and academic publications with over 120 separate co-authors.

The limits on time, energy, and attention faced in introducing a Festschrift for Professor Haynes do not allow us to fully describe the impact he has had on knowledge in regional science and applied geography nationally and internationally. We could not say it better than Peter Nijkamp, Emeritus Professor of Regional Economics and Economic Geography at the Vrije Universiteit in the Netherlands:

> Kingsley Haynes has a long standing career in the area of regional science. He belongs to the second generation of regional scientists who have built on the scientific inheritance of founding fathers, such as Walter Isard, Charles Tiebout and Bill Alonso on the American side and Leo Klaassen and Torsten Hagerstrand on the European side. Kingsley has been for decades a great ambassador of regional science. His pioneering and seminal work covers a wide range of regional science topics, ranging from metropolitan areas to developing countries. He is one of those surprising scholars who can be found at many meetings all over the world. That also explains his great international reputation: he is a typical travelling salesman for regional science, always accompanied by his inspiring wife Susan.
>
> Kingsley Haynes has been very influential in the quantitative orientation in regional science. His interesting research is always characterized by advanced modelling and statistical techniques. In this way he has been very influential in shaping the next generation of regional science researchers.
>
> In addition to his great scholarship, he has also played an important role in leading functions in the Regional Science Association International (RSAI). His admirable administrative skills have also made him a core person in regional science, not only domestic but also international.

The core intellectual content in much of Kingsley's work is simply fascinating, which is one of the reasons some of his students are so devoted to him. He consistently takes a distinctly theoretical, quantitative, and analytical approach to problem-solving. His is not an approach to research based upon deducing actual regional phenomena from theory and mathematics. Rather, in the approach he taught to us, the actual phenomenon is to provide inductive verification of the general principles from which regional scientific theory and mathematics starts. All of the empirical observations and data are to retain their full evidential value. Insofar as possible, the observations and data confirm (or disconfirm) not merely a particular theory but also the general conceptual or mathematical foundations from which the

deductive chain of reasoning starts. The theory and concepts as well as the data provide insight and guidance for finding the solutions to problems. Thus, he has never fallen prey to the all-too-common tendency to emphasize the theoretical and mathematical dimensions of research at the expense of the empirical dimensions or vice versa. Rather he has been able to consistently find and apply the interconnection between them all. Despite the significance of so much regional scientific and other theory and of all of the associated deductive mathematical constructions, Kingsley has consistently kept empirical investigation and real-world problem-solving of paramount importance.

But perhaps above all of Kingsley's contributions in importance is the impact he has had on his many colleagues and students. To characterize the sorts of relationships he has built and maintained, which of the three of us are privileged to share, we asked Dr. Fred Phillips to comment:

> Meeting Kingsley Haynes in 1974 was a fortuitous turning point in my education. Further, it was a meeting that grew into a lifelong friendship. As a graduate student in operations research I had little opportunity to engage my personal interest in places, especially in the lure of faraway ones. My PhD advisor, Abe Charnes, wisely saw how these could connect with O.R. He encouraged me to work with Kingsley, who was then a young professor in UT-Austin's geography department, about to move to UT's LBJ School of Public Affairs.
>
> Our first work together, with geography grad student Jerry White, was the Texas coastal planning project. It involved much productive writing of papers and questionably productive consumption of beer. I think it's fair to say that Kingsley in those years was primarily an impresario of research. At first I wondered why he would take this path, but I came to realize that this stance, bringing him into contact with many researchers in many fields, was Kingsley's deliberate learning strategy. Watching it was one of the ways I learned how to learn. In my later positions, I put it to good use.
>
> Though I'm now known as the Flying Professor, I have not matched Kingsley's amazing record of travel and adventure. I keep trying – often encountering Kingsley and Susan in exotic locales.
>
> I'm glad to have this chance to say, "Kingsley my friend, many thanks!"

With only slightly further effort we could undoubtedly have obtained literally dozens of such statements from former students all around the world.

The chapters in this volume span a wide range of issues and use many different methodological approaches, but the chapters are tied together by three attributes of Kingsley's professional work that have influenced his friends and colleagues. First, Kingsley works on important problems that have real consequences of human well-being. Academic minutiae and theoretical niceties have never drawn his attention. Throughout his career, Kingsley has been engaged with questions about economic and social development, in both low-income, middle-income, and high-income countries. His focus on research that can improve human well-being and promote development is reflected throughout this volume but especially his interests in the roles of infrastructure and the management of natural resources in regional development.

Second, Kingsley's research incorporates the practical realities of complex problems. He studies the complexities of the world as it is, not as a theoretical abstraction. He has used a wide array of systems tools and quantitative methods to characterize these complexities. Indeed, it would not be an exaggeration to say that only a handful of scholars in the world are as skilled and proficient in so many quantitative methods. But systems analysis and quantitative methods were never an end in themselves; his

objective was always to use these techniques to develop a more realistic, sophisticated, nuanced assessment of complex problems.

Third, Kingsley's work has been profoundly interdisciplinary. He is at home in the disciplines of geography, regional science, economics, planning, decision science, and public policy analysis. As a public policy analyst par excellence, he was never caught up in the current preoccupation of the economics profession with the identification of causal relationships, which often limits the analyst to working on minor development problems. Kingsley Haynes' work and interests were never restricted by what a discipline defined as an acceptable problem or by what a particular method was able to do.

So, his work has been important, practical, rigorous, and interdisciplinary. And it was all done with an infectious joie de vivre that has inspired both students and colleagues.

He was on the faculty at four leading universities: University of Texas-Austin; Indiana University; Boston University, and George Mason University. We represent his former students from three of those universities and are very honored to have been invited to be Editors of this volume.

1.1 Overview of the Book

The book is organized in three parts. Part I concentrates on clarifying fundamental issues pertaining to development studies and regional science. In Chap. 2, Antoine Bailly and Lay Gibson uncover potentials to expand the content of regional science without disturbing its established character. It also discusses the need to minimize risks to the content while gathering the benefits of expanding the discipline into new content areas.

In Chap. 3, Kenneth Button provides a novel perspective by addressing a fundamental question: is there any substantial intellectual difference between regional science and other economic subjects, such as regional economics? Through a thorough review of regional science-related journals, the chapter explores the general patterns of specialization in economics. It then discusses the driving factors and moves to review the development trends of spatial economics and recently debated problems in applied economics.

Chapter 4, written by Alan Murray, discusses essential microscale thinking for bringing about change in order to mitigate the negative impacts of human-induced growth and development. The use of spatial analytical approaches, such as geographic information systems, spatial optimization, and spatial statistics, is considered. Central themes of microscale thinking and their applications for decision-making are reviewed, and their importance for achieving long-term sustainability and resilience are highlighted.

In Chap. 5, Richard Wright explores some of the core issues of social equity in development studies from the perspective of residency, race, and public employment. Using a case study in cluster towns in Northern New Jersey as an example, the

analysis reveals that residency requirements designed to be inclusive can operate to be exclusive at the same time.

Chapter 6 was contributed by Mustafa Dinc. It explores the challenges of conflict in humanitarian local and regional economic development. Through a thorough examination of the conflict and related issues in the information age, the chapter provides insightful implications for future developments in information and communication technologies.

In Chap. 7 Laurie Schintler uncovers the new opportunities and challenges for regional policy analysis in the era of spatial big data. She further discusses the suitability of various methods and techniques, such as Data Envelopment Analysis, shift-share analysis, and spatial econometrics and statistical models, for the assessment of spatial big data. The chapter suggests that for spatial big data to achieve its full potential, a multidisciplinary approach, such as an integration of machine learning models with traditional nonparametric methods and econometrics models, may ultimately augment all stages of policy analysis. Such an approach will also contribute to the formulation and implementation of policies that support livable and sustainable regions.

In Chap. 8 Zheng Wang focuses on exploring some of the technical aspects of spatial modeling, which itself has a potential to advance the understanding of spatial interactions in the process of social and economic development. The chapter extends the spatial interaction model from the pioneering work done by Wilson (1970) by applying statistical mechanics of physics with an aim to improve the applicability of the model. The modeling framework provides new insights for the understanding of interactions of various agents, such as people, goods, and financial resource in space.

Computable general equilibrium (CGE) analysis, as the state-of-the-art method for economic impact analysis, has been widely adopted in development studies. However, the results of CGE analysis are generally reported based on macroeconomic indicators, such as GDP and employment, whereas less attention has been paid to economic welfare. James Giesecke and John Madden in Chap. 9 evaluate factors that affect the net social benefits of an economy using CGE. The chapter demonstrates that the most commonly adopted indicator for measuring the outcome (GDP) turns out to be a poor proxy for the effect on economic welfare. Instead, CGE modelers should focus on economic welfare indicators.

Part II of this volume introduces various cases that address challenges and opportunities in the process of development through the lens of Asian countries. Specifically, Chap. 10, authored by Barry Solomon and Fei Li, addresses environmental (in)equity in the patterns of toxic chemical releases vs. residential location. Using nuclear waste repository siting as an example, the chapter analyzes this issue through four case studies in Japan, South Korea, China, and Taiwan following unified equity principles. Their study reveals that governments in all of the cases need to work more diligently to maintain environmental equity for nuclear waste repository siting.

In Chap. 11, Inácio Araújo, William M. Bowen, Randall Jackson, and Amir Neto provide new insights to understanding the proximate causes of the change of CO_2 emissions and how its influence on economic development varies among different

megaregions in Japan, the United States, Europe, China, India, and Russia. Through applying structural decomposition analysis to the World Input-Output Database, their analysis confirms that the patterns of emission vary substantially between developing and developed nations. In addition, their chapter reveals that increased consumption levels are the major driver for the increase of CO_2 emissions, which implies the unlikely but nevertheless logically and empirically justified conclusion that future policies need to emphasize eliminating ever-greater consumption.

Chapter 12 is contributed by Syed Hasnath. The chapter analyzes uneven development patterns in Bangladesh with a focus on income equality. The chapter suggests that moving and allocating resources to less developed regions for industries, infrastructure, and social overhead would help to increase income levels.

While most Asian countries are still in the development stage, the rapid economic development in China over the past decades has also strengthened its role in the regional economic systems in Asia and beyond. One of the salient examples is the implementation of the One Belt and One Road (OBOR) Initiative, also known as Belt and Road Initiative (BRI). In Chap. 13, Kailai Wang and Zhenhua Chen evaluate the role of infrastructure investment and regional economic growth with a focus on 65 OBOR countries. A dynamic shift-share method is adopted to decompose the employment changes into various effects, such as regional share, industry mix, and local shift. The analysis shows that the variation of employment is substantial among different sectors and countries. Hence, future infrastructure development strategies should be prioritized in accordance with regional competitiveness of different countries.

In Chap. 14, Francis Fukuyama and his colleagues further discuss the different approaches of infrastructure development between China and the Western world, using the BRI as an example. The analysis starts with an introduction of the origin of Chinese policy for development. Through a careful comparison of the Western and Chinese infrastructure investment strategies in terms of planning, financing, and deployment, the chapter provides important insights on infrastructure development that should be useful in future decision-making for both the Chinese government and Western development institutions.

In Chap. 15, Serdar Yilmaz and Robert Ebel extend the discussion of development challenges that East Asian countries face from the perspectives of governance, infrastructure, and public finance. The chapter begins with a review of recent literature on infrastructure deficit and the link between infrastructure services, economic growth, and development. It then discusses the function and goal of the intergovernmental organizational and institutional arrangements. The chapter concludes with a discussion of the risks related to debt financing by subnational governments.

Chapter 16, by Yang Zhou and Jean-Claude Thill, develops a new approach to identifying socioeconomic communities through a regionalization of urban structure based on transportation network data. Using taxi data with detailed information from the city of Wuhan, China, as an example, the study reveals that a new approach based on big data analytics is able to capture the socioeconomic characteristics through flow data. Such a finding also provides critical implications for urban planning and development. For instance, the efficiency and effectiveness of spatial

configurations of the built environment and local communities may be improved through a better understanding of urban flow and urban structure.

Some of the development challenges, such as the lack of a sufficient infrastructure system and problems with social and economic inequality, are especially important in developing countries. Other problems, such as how human societies might adequately deal with the scarcity of critical resources such as water and how regions might attract and maintain high-skill labor to support sustainable growth, are more generic and are important in both developing and developed countries. Part III examines some of these development problems and issues from a global perspective. It is intended to provide readers with a holistic view of various ideas and approaches that may help us find solutions.

In Chap. 17, Joseph Cook and his colleagues provide an evaluation of customer assistance programs (CAPs), a strategy to address waster scarcity through implementing full cost recovery tariffs for water and sanitation services. Such programs are designed to help ensure that poor households have access to piped water and sanitation services, while water utilities implement price reforms to address revenue generation and water conservation objectives. Based on a comprehensive review of CAPs from industrialized countries and low- and middle-income countries, the chapter provides public agencies both in developed and developing countries with guidance for considering the effectiveness of their water subsidy programs.

Haifeng Qian in Chap. 18, addresses a fundamental question related to entrepreneurship and the geography of intergenerational economic mobility: why do young people born in some cities demonstrate a greater probability of moving up the income ladder than those born in others? The empirical analysis confirms that intergenerational upward mobility does have a positive statistical association with entrepreneurship activity. The empirical evidence, although preliminary, provides important insights for policy makers to better understand the benefits of entrepreneurship.

In Chap. 19, T.R. Lakshmanan and William Anderson discuss the nature and scope of the economic structural evolution in the dynamic settlement corridor stretching from Boston to Washington, D.C. in the United States. Through a review of the classical work by Jean Gottmann and an analysis of the urban development patterns in the I-95 corridor for a period of over a half-century, the chapter indicates that the economic dynamism along that corridor over recent decades has interdependent consequences for newly emerging transport and communication systems. The development of new technologies facilitates the rise of the global economy, and further promotes the emergence of new knowledge in the manufacturing and service economies.

Chapter 20, contributed by Bob Stimson and Alistair Robson, investigates factors that explain the spatial variation of endogenous regional employment performance in Australia. An integrated method of both shift-share analysis and regression modeling is applied to data that cover the period 1996–2016. The results confirm that factors such as population size, industrial structure, and the degree of concentration play major positive roles in the growth of endogenous regional employment.

However, the association between population and employment can also be different in other countries. In Chap. 21, Gordon Mulligan and Helena Nilsson

analyze recent population and employment change in 381 US metropolitan areas. Using the simple but fundamental adjustment model, the chapter reveals that the changes of population and employment can be quite distinctive. In addition, the results further indicate that employment growth in many small US cities does not necessarily follow the traditional pattern of demand-induced growth (where people follow jobs). Overall, the chapter suggests that future development policies need to be developed more cautiously with a consideration of the size of the targeted metropolitan area.

Adam Rose, Zhenhua Chen, and Dan Wei evaluate the benefits of US antidumping (AD)/countervailing duty (CVD) enforcement in Chap. 22. This issue has become particularly relevant for economic sustainability given that global trade tension is on the rise due to the influence from the Trump Administration. Using the Global Trade Analysis Project (GTAP) Model, a multicountry computable general equilibrium (CGE) model, the research finds a positive impact of AD/CVD duties on the US economy. The chapter suggests that what at first might be viewed as an impediment to international trade actually benefits the US economy in a small way. Also, some sectors, such as electronic equipment, gain more than others.

In Chap. 23, Umut Turk and his colleagues examine the impact of job accessibility on social capital with a focus on rural areas in both Turkey and Italy using a quantile regression model based on a data at the NUTS3 level. The study reveals that social capital in response to accessibility and rurality in Turkey and Italy varies substantially, which could be mainly explained by their different levels of spatial accessibilities.

Chapter 24, contributed by Marco Alderighi and his colleagues, analyzes the issue of price discrimination and inter-group externalities in airline routes between European cities. The chapter provides some important empirical evidence that might help to improve air travel service through optimizing airline pricing.

In Chap. 25, Fred Phillips and Nasir Sheikh provide practitioners of economic development with a new perspective to understand the factors affecting business relocation incentive decisions. A multi-criteria decision framework called STEEP (Social, Technological, Economic, Environmental, Political) is adopted for the assessment. Based on a detailed analysis of survey results from economic development professionals, the chapter reveals that although the economic perspective is the key factor for business relocation decision-making, other factors in STEEP may also be important.

Last but certainly not least, in Chap. 26 Richard Florida and Charlotta Mellander examine the relationship between human capital and cross-national innovation and economic performance. The novel aspect of their work is that innovation and economic performance are measured by three indicators, all of which are associated with a new measure of human capital that focuses on the creative class. The results confirm that the occupation-based creative class measure is associated closely with all three measures of innovative and economic performance.

Overall, although this volume is the product of the contributions of a wide range of people, including scholars who are experts in development studies and regional science and practitioners who work at various organizations, all of them have been

directly or indirectly influenced intellectually by Kingsley Haynes. Scholars and students who are interested in development studies and regional science will greatly benefit from the multidisciplinary analyses of the variety of case studies in the book. Planners and policymakers who are interested in obtaining new insights about regional economic development will also find the diverse perspectives captured in this volume valuable for their development practices.

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Part I
Fundamental Issues

Chapter 2
Expanding the Content of Regional Science: Risks and Rewards, an Essay

Antoine S. Bailly and Lay James Gibson

Abstract Regional Science has developed as a rigorous science with a strong foundation in economics and geography. There is no apparent reason for regional science to seek an entirely new orientation, but there is an argument for it to expand its horizons and reach by exploring opportunities for incorporating other disciplines. The idea here is not to dramatically shift the focus of regional science but rather to encourage the incorporation of new content and to expand the participant base by scientists and scholars who benefit from incorporating their fields with the approaches offered by regional science. The potential rewards are substantial but there are risks too. One obvious reward for disciplines and professional fields that elect to work within a regional science framework includes viewing problems through a new lens. The risks might include the dilution of the distinctiveness of the regional science approach as it seems to try to be all things to all people. This paper explores potentials to expand the content of regional science without disturbing its established character. And it discusses the need to minimize risks to the content while gathering the benefits of expanding the discipline into new content areas.

Keywords Epistemology of regional science · Pluridisciplinarity · Future of regional science · Social and economic sciences

> We need to pry into the space-economy with welfare considerations in mind to relate spatial structures to social well-being and to introduce political variables and policy decisions. . . . (Isard 1956:287)

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2.1 Introduction

Scholars interested in strengthening regional science usually want to encourage its growth by promoting its application to a variety of research questions in a number of different settings. This was certainly an issue approached by the founder of regional science, Walter Isard, in a number of different settings including conferences, keynote addresses to colleagues, and publications. Isard saw the regional science perspective being of value to researchers in a host of different disciplines and professional fields. Isard's "Fused Framework" (Isard 1960:685) (Fig. 2.1) illustrates the complexities of dealing with political, social, and economic systems when cultural context comes up against efficiency and equity goals in cultures with different values.

We share Isard's enthusiasm for spreading the word, but we are also cautious realizing that a possible downside is that regional science might spread itself too thin and dilute its real power by trying to be too many things to too many research problems.

What we are proposing is not new, but we think that it does deserve another look given the growth in publication outlets and regional science conferences in recent years. Most disciplines want to grow and extend their reach and regional science is no exception. We want our conferences attended by an ever-increasing number of appropriate scholars; we want conference programs populated by challenging

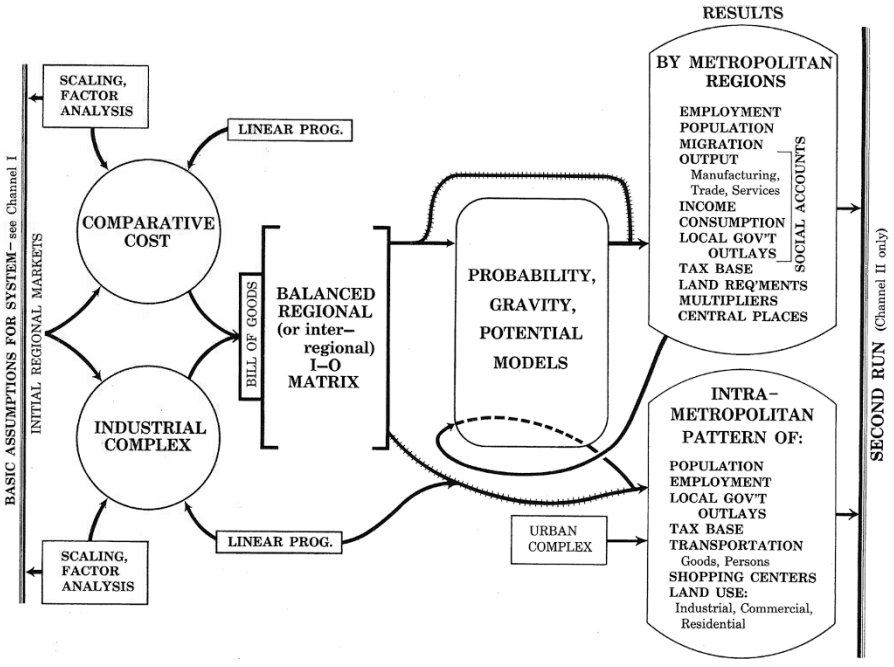

Fig. 2.1 Fused framework (Isard 1960:685)

quality papers that are competitive for program time. In the 2018 Goa RSAI World Congress, the focal theme is a common pursuit of a sustainable future, by a better understanding of the region as a spatial unit (not only physical and social spaces but shared space). The sub-themes show the necessity of a change: water management; smart cities; territorial governance; walled territories; regional cooperation; climate changes; rural transformation; leisure, tourism, mobility; citizenship and regional planning; conflict-migration; disaster management; globalization – regionalism, gender – social justice; innovation, entrepreneurship. The same is true of regional science publications. But we don't simply think that bigger is necessarily better. We want content that complements, and perhaps even extends the core concepts and approaches of regional science. We want to continue to do what we do, but we are willing to do even more if it is consistent with the fundamental notion of space science.

2.2 Academic Influences: Past and Possible

As we review a few of the academic influences on regional science, it is fair to make note of the disciplines and techniques that have been much in evidence since the second half of the 1950s and those which seem to have potential to emerge and grow in the near future. The definitive list of academic influences would be long; regional science is a discipline that has an almost endless capacity to incorporate ideas and approaches from other fields both theoretical and applied. For purposes of discussion here, we will limit our discussion to just nine academic disciplines and professional fields.

1. Economics

This is certainly the major influence on regional science today and over the past 60 or 70 years too. The founder of regional science, Walter Isard, was trained as an economist and brought this training to the emerging discipline of regional science which drew heavily on the field of location theory. Much of Isard's early work drew on economics, was quantitative, and stressed rigorous analysis. These have become hallmarks of regional science and, perhaps, limiting features of regional science too. When looking at potentials for expanding regional science, an obvious potential constraint is the issue of rigorous analysis. In other words how soft is too soft? Is there room for a softer and more subjective approach to regional science? Our hunch is that regional science will be very tolerant of other perspectives, especially at the margins. We wrote in 1994 (Bailly and Coffey 1994:13) "In making these observations, we are not advocating the abandonment of either basic research in regional science, or research on economic activities. Rather, what we are advocating is a more balanced approach" to reevaluate the foundations and the goals of regional science. But it is difficult to imagine a regional science that is not at its center quantitative and rigorous. Economics has been, and we are sure will continue to be, a lynchpin of the regional science discipline.

Supporting these assertions is the fact that Isard himself was eager to explore the connections between regional science and a number of other disciplines, especially geography but also sociology, psychology, city planning, and political science. He also founded the Peace Research Society. Isard saw regional science as being a "big tent," and this implies that regional science should be sympathetic to efforts to expand its reach by being tolerant of new perspectives and new approaches.

2. Geography

> Unlike geography, regional science is much more confined to scientific analysis of social processes. (Isard 2003:188)

This discipline, especially the quantitative and analytical approaches favored in the second half of the twentieth century, is also a major influence and is compatible with the location theory approach so much in evidence in the early years of regional science (Berry 1967). Hopefully this will be the case for years to come although Professor Arthur Getis suggests that quantitative and analytical approaches in geography may be on the decline (Paper presented at the 56th Annual Meeting of the Western Regional Science Association, February 2018). Ideally even an evolved form of quantitative and analytical geography will have something to offer regional science as we know it now and as it too grows and evolves in the future. Especially in urban studies (Glaeser 2011), and in the field of geo-political approaches to regional

Table 2.1 Geographical questions and concepts

Questions	Concepts	Extensions
Where?	Place	Latitude and longitude Site
How far?	Location Territory Environment	Limit Frontier Natural hazard Topophilia Political implications
How much?	Quantity Measurement	Distance Scale Density Flow Population Duration
Who and to whom?	Identification	Strategy Human risk Demography Interaction
How?	Representation	Development Information Quality of life
Why?	Understanding Analysis Explanation	Socioeconomic and spatial explanations

questions, such as identities, regional freedom, migrations... Geographical questions can be useful for regional science (Table 2.1) (Bailly 1995:787).

3. Sociology

> Regional science is primarily a social science. It is concerned with the study of man and spatial forms. (Isard 2003:188)

This discipline has attributes including a tradition of rigorous quantitative analysis that gives it the potential to have a strong influence on regional science. But some might argue that thus far sociology has not realized its potential. Perhaps sociology is a bit like geography inasmuch as both of these disciplines have been distracted by so-called social theory and have wandered off from a trajectory that would be sympathetic to the core of traditional regional science. However, it is clear that Isard saw sociology with its focus on the functioning, development, and structure of human communities, and its concern with social problems would be an ideal partner in a larger and more fully developed regional science. Sociology has not been quick to take its place near the front of the pack in an expanded regional science, but it would certainly be welcome especially in an applied regional science which focuses on regional problem-solving, especially on territorial identities.

Demography has traditionally been recognized as an important part of sociology, geography, and economics too and might be considered separately or as a part of any one of these three sciences. In a time when we expect new world migrations and changes in the demography, demography could likely be a major branch of regional science in the years ahead.

4. Environmental Science

This field might be thought of as a stand-alone discipline or perhaps as a subfield of geography and natural sciences. It certainly has not risen to the top among regional science conference topics and journal submissions despite its popularity in academic circles and in public policy discussions. Professor Isard saw environmental issues as a future "growth industry" and to stake out this turf for regional science published a book on "Ecological-economic analysis for regional development" in 1973. Whereas it is fairly easy to see how environmental science and regional science can join forces, less clear is the question of who exactly might champion the merger. One proven partnership is that of environmental engineering and regional science (Kahn 2006). Similarly physical and environmental geography and regional science show evidence of being comfortable as cooperating disciplines, often now in the same departments which focus on climate change, pollution, and environmental risks.

5. Management

Both business and public sector management have boomed in importance as academic subjects for 50 years or more. Unfortunately the link between regional science and regional management appears to be less robust than regional scientists might prefer at this time. Perhaps as regional science continues to grow as an applied science, the skills and understandings that it offers will be more obvious to those

building curriculum in schools of business management and public policy and public management (Haynes and Nijkamp 2006). Ideally additional graduate programs in these fields will join those in the United States, Canada, Japan, France, and several other European and Asian nations which are already firmly committed to regional science perspectives in management solutions to public and private sector issues. Many management schools (such as ESSEC in France) have regional science professors to prepare students with regional management skills.

6. GIS: Geographic Information Systems

GIS has terrific potentials for use when dealing with a variety of applied regional science problems. Early on two things slowed the adaption of GIS. First, the technical and hardware requirements for GIS put it beyond the reach of some geographers and regional scientists. Second, there was an argument that GIS was "simply" a technique and not a legitimate focus for scholarly research. Both of these one-time barriers have been pushed aside over time, probably, by the simple force of GIS as a problem-solving tool. Today it is so widespread that it is difficult to imagine regional science without GIS. It is a popular component in many regional science research designs, and it is a stand-alone focus for both public and private sector applications. Looking back it is hard to imagine why it has taken so long for GIS to gain prominence in regional science research. Today it has arrived and is expected to be even more prominent in the future.

We are reminded of W. Tobler's work (1970) to develop a basic law in geography and regional science. In his classic 1970 article where he offhandedly penned the first law of geography, in defending the parsimony of his model of urban population growth, he noted: "The model I describe, for example, recognizes that people die, are born, and migrate. It does not explain why people die, are born, and migrate. Some would insist that I should incorporate more behavioral notions, but then it should be necessary to discuss the psychology of urban growth; to do this properly requires a treatise on the biochemistry of perception, which in turn requires discussion of the physics of ion interchange, and so on" (1970:234). The first law of geography is succinctly stated as: "everything is related to everything else, but near things are more related than distant things."

7. Human Ecology

It is easy to make a case for human ecology being a natural field of interest for regional scientists. It explores the relationship between humans and their cultural (social, political, and economic), natural, and built environments. The reasons for only limited interest in the regional science community are not totally clear, but a lack of quantitative analysis might leave some regional scientists with the idea that human ecology is "too soft." In the first one-half of the twentieth century, there was reason to believe that human ecology might dominate the "Chicago School of Sociology." In the mid-twentieth century, advances in planning and architecture incorporated human ecology, but it does not seem as though much of this has rubbed off on regional science. It certainly could, and perhaps should, but it hasn't, despite the useful results of factor-analysis on metropolitan regions. For K. Donaghy (2014),

Isard was thinking that economic theory did not explain the behavior observed in the real-world and wanted to introduce culture and quality of life in his models.

8. Planning

The link between regional science and planning is strong and appropriate (Rodwin and Hollister 1984). Planning is a professional field that draws on regional science and geography, among others, for its theory. The relationship is by no means exclusive, but it is well established and strong. Planning of course covers the waterfront, but city and regional planning are both good examples of types of planning where regional science perspectives and techniques are especially useful. There is also often a significant connection between public management and policy and planning, especially in countries where planning is considered as necessary for a balanced growth. France is an example where most regional scientists worked with the DATAR (the central planning agency) for a long time linked to the first minister, then with the minister of ecology. Well-known names in regional science, as Perroux and Guigou, were in charge of the national urban planning. Furthermore there are many examples from elsewhere including Robert E. Dickinson (UK) and Niles Hansen (USA) to name just two. We should remember also that the *Regional Science Review* was started by W. Isard, out of a concern that other regional science journals did not pay sufficient attention to planning questions or international topics.

9. Peace Science

It is appropriate that the ninth and final discussion of academic influences, past and possible, is peace science inasmuch as Walter Isard is the father of both regional science and peace science, and regional science is often the rigorous scientific foundation that many peace science questions are built upon. Isard founded the Peace Science Research Society (International) in 1963 roughly 10 years after he founded the Regional Science Association. Isard was joined in this undertaking in Malmo Sweden by distinguished social scientists Amos Rapoport and Kenneth Boulding. Isard won the Founders Medal in Peace Science in 2005. Peace Science has produced a rich and extensive literature which covers a wide range of topics including the role of defense spending in shaping national economies.

The importance of Peace Science to understanding national economies during the "cold war" was fairly obvious. Sixty years after the establishment of the Peace Science Society the exact nature of conflicts and the geographic venues of conflicts may have changed, but the need for thoughtful and scientific analysis of conflicts, arms control, and conflict resolution is as compelling as ever.

2.3 Risks and Rewards

A strong case can be built for expanding the content of regional science, but this doesn't mean that there are no risks which come with what is potentially "disciplinary overreach."

It is likely that any decision to expand the content of regional science scholarship will be made by an individual initially on a modest scale perhaps in much the same way that Walter Isard would give a public lecture on the way that sociology could, or already had contributed to the development of the discipline. There is no clearing-house to manage this issue. An individual with substantial background in public management and regional science submits a conference paper combining those two approaches, or this same paper is submitted for publication in a regional science journal. Either way we see an individual move forward into new territory. Unless such efforts are dismissed as inappropriate, it will likely continue and be recognized as a legitimate extension of regional science. Further, collaborations of this sort will lead to more conference papers and more published papers that explore public management issues through the eyes of the regional scientist.

Three possible risks are initially identified and an equal number of possible rewards.

First, if regional science tries to be all things to all people, it could obscure its distinctive focus as a quantitatively oriented theory-based spatial science. Rather than moving toward its objective of becoming a fundamental research discipline, it could find itself thought of as being a loose collection of social, humanistic, and even environmental disciplines. The fragmentation of sciences, with different forms, methods, and norms, calls for a better integration, a real transdisciplinarity. From a regional science for society to a regional science *with* society (Scholz and Steiner 2015), transdisciplinarity extends beyond interdisciplinarity to solve real-world problems and to cope with the new complex regional problems, such as identities, migration, resource use, pollution, injustice... an expansion of the context of the field.

Second, the regional science "brand" suggests strong elements of quantitative rigor and oftentimes content from the socioeconomic sciences are essential ingredients in the thing called regional science. Changes in content should preserve the sense of regional science as it has evolved since 1950.

A third possible risk is that of expanding into content areas that make regional science seems frivolous. Regional science will best be served by work that establishes its value to public and private decision-makers who deal with serious issues. Regional science should work to establish itself as essential and profound, not trivial (Haynes et al. 2008).

Possible rewards are numerous, but we shall discuss three to demonstrate that payoffs of an expanded regional sciences scope can be substantial.

First, it may be time to follow Walter Isard's lead and continue to expand regional science into areas that are the focus of other disciplines and professional fields. With this expansion will come the opportunity to welcome a new cohort of scholars to the regional science community and a new cohort of beneficiaries in both the public and private sectors.

Second, by expanding the content of regional science, there may be an opportunity to promote more broad-based participation in regional science conferences thereby encouraging a more diverse mix of participants, with scholars interested in a mutual learning process and interactions (and a more robust revenue stream for the

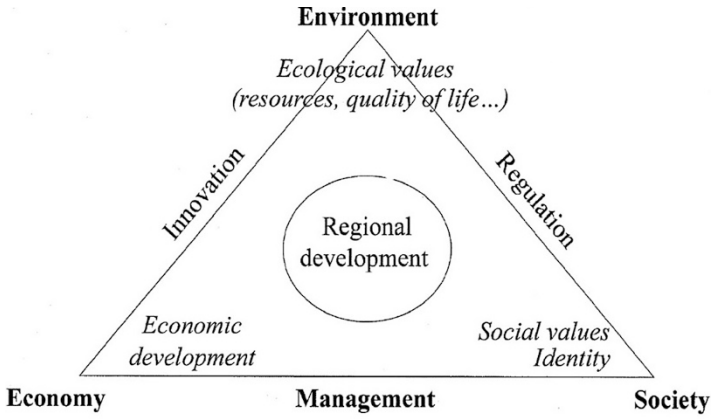

Fig. 2.2 The regional science triangle

organizers). The same might be true for publications. Enhanced quality could follow increased competition for space.

Third and finally, real-world problems typically benefit from a broader and less narrow approach than do more purely disciplinary problem-solving exercises. A broader definition of "appropriate content" could be supportive of initiatives designed to encourage applied research by regional scientists that would focus on real-world research problems (Fig. 2.2).

2.4 Concluding Thoughts

Even in the very early years of regional science, Walter Isard was at work incorporating new content from other professional fields and disciplines into the body of this evolving discipline. It would seem that current or even accelerated efforts to do this sort of thing are clearly appropriate. Some new content is intuitively more appropriate than other content, but when new content adds value, it is likely to be retained. There are a number of established and emerging disciplines and fields of scholarship that appear to have the potential to both sharpen and broaden the problem-solving power of regional science and in the process of doing so enhance their own power and usefulness.

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