

Promoting Local Innovation as a Development Strategy

Innovations Case Discussion: The Honey Bee Network

The current conventional wisdom is that the world's most successful nations are those best able to produce, acquire, deploy, and control valuable knowledge. Knowledge, especially new knowledge unavailable to one's rivals, is key to international competitiveness and therefore to national prosperity.

This assumption is simplistic and not entirely accurate. Oil-rich Qatar and Brunei can do quite nicely without having to be creative at all, except perhaps in finding the best ways to invest their income. But India is mired in poverty that may take generations to eliminate, despite Bollywood, its impressive and rapidly expanding software industry, and its sizeable and growing biotechnological capacity in relation to its GNP. Nonetheless, this assumption is fervently held by many policymakers around the world. As the United Kingdom government expresses it, for example, the nation's economic competitiveness, and that of its competitors, "is increasingly driven by knowledge-based industries, especially in manufacturing, science-based sectors and the creative industries."¹

Such thinking is hardly new, but has not necessarily inspired policies conducive to innovation. In the middle ages, Venetian glass was renowned for its quality and generated great wealth for the city state. Understandably, this made the government desperate to protect its highly valuable know-how. The glassmakers, whose techniques were acquired partly from Germany and Syria, were forbidden to ply their trade outside the city state or to give away their secrets. Transgressors could lose their lives. At the same time, foreign glassmakers were banned from operating there. It may not be entirely coincidental that Venice was the first place in the world to pass legislation providing patents for inventions; it understood the strategic importance of protecting valuable knowledge. But neither should we be surprised that despite its illustrious history and the persistence of its now small glass industry, the city has long been a glorified open-air museum sinking slowly but inexorably into genteel decline—and into the Adriatic.

Historically, Venetian-style "knowledge mercantilism"² has not been uncommon. But valuable as new or scarce technical knowledge can undoubtedly be for

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the economy, it could rarely be kept for long from the clutches of foreigners. Britain learned this lesson just before and during its industrial revolution when official efforts to prevent the “leakage” of skilled people and machinery to America and the European continent were largely unsuccessful.³ Those who control knowledge may more easily make money from it but too much control can backfire. We learn more quickly when we have access to other people’s knowledge rather than just relying on our own; and refusing to share our knowledge rarely induces others to share with us. The modern patent system reflects this understanding, albeit less than perfectly, by requiring written disclosure of the invention in exchange for the exclusive rights awarded. Published patent documents are an important source of technical information, at least for those who can understand the relevant art.

Nonetheless, the idea has persisted that having more knowledge, especially new knowledge with commercial applications, improves a country’s trade balance. In 1852, Lyon Playfair, a British politician and public intellectual of his day, warned that Britain needed to realize what its foreign competitors already did: that “the competition of industry has become a competition of intellect.” Nowadays, that sounds like a statement of the obvious.

If we accept that useful new or scarce knowledge (which I call “innovation”) contributes vitally to wealth creation, what does this imply for developing countries? International organizations like the United Nations Development Program, the World Intellectual Property Organization, and the World Bank report on the rates of patenting and access to education at various levels; taken together, these statistics appear to demonstrate that few developing countries are managing to be innovative. In fact they must improve their innovation climate dramatically before they can be competitive in high technology fields, except perhaps, like Costa Rica, as assemblers and exporters of high-tech goods invented elsewhere. Admittedly, our usual indicators of innovation, such as R&D spending, education statistics and patent counts, do not tell the whole story and may in fact be misleading. But the massive innovation gap between the rich and poor worlds will not be bridged for a long time except by a few elite countries, like China, India and Brazil.

But is this negative and pessimistic view about developing countries entirely accurate? Is there really a massive knowledge and innovation gap between the rich and poor worlds? Confusingly, the best answer to both questions is “yes and no.” The “yes” part is obvious. North America, Western Europe, and East Asia have a massive lead over the rest of the world in virtually all of the usual social and economic indicators. But why does the answer contain a “no” at all? Of course the developing nations face huge obstacles, but the key issue is the cultural bias in how we use terms like “knowledge economy” and “knowledge worker.” By doing so we may underestimate the presence and vital role of applied knowledge in all societies, including those that appear to be the most backward and traditional.

Creativity is absolutely not the sole preserve of suited knowledge workers in glassy office blocks, professional artists and musicians, and white-coated laboratory scientists. If necessity really is the mother of invention, would we not expect to see most innovation where the needs are greatest? And no needs are greater than

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those of desperately poor people getting themselves and their families through each day alive and well. So how can we just assume, as we tend to do, that the world's knowledge and innovation "hotspots" are urban areas located almost exclusively in Europe, North America, and East Asia?

Anil Gupta's work, as presented in this issue of *Innovations*, is a welcome challenge to the usual assumptions that innovation is by definition "modern," and that people in developing countries, especially in rural areas, are not innovative and possess little knowledge of use to anyone else. But its main contribution is not so much to cheerlead for local innovators as to offer plausible ways to create wealth for some of the poorest societies in the world on the basis of the knowledge that rural dwellers already have and the new knowledge coming out of these areas, far more than we suppose. His solutions are based not on secrecy and going it alone, as in medieval Venice, but on disclosure, and especially on collaboration and exchange within the widest possible geographical area.

THE NEW THINKING ON TRADITIONAL KNOWLEDGE AND LOCAL INNOVATION

Until the 1980s, development planning was usually based on very negative assumptions about traditional rural societies. Poor rural dwellers were generally assumed to be backward and resistant to change, and their livelihood practices, such as shifting cultivation, were thought to be at best inefficient and unproductive and at worst environmentally destructive. But starting then, these people began to gain broader respect for their cultural richness, their sophisticated natural resource management expertise, and their agricultural and health-related knowledge.

The more enlightened attitudes towards the knowledge, skills, and subsistence practices of rural communities in developing countries emerged, according to Adams, "as part of a liberal and populist reaction against the unsuccessful technological triumphalism of rural development practice."⁴ These attitudes have become increasingly mainstream in academia and among international development and conservation agencies. Since the 1990s many multilateral and bilateral donor agencies, including the World Bank, have come to recognize and actively promote the role of local knowledge in sustainable rural development programs. Also, many conservation and development agencies consider what the 1992 Convention on Biological Diversity refers to as "the knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles" as a hitherto barely tapped source of ideas and techniques that can be harnessed to pursue more sustainable paths of development. Of course we should not be too romantic: some traditional knowledge and local innovations and practices are not worth keeping. Still, this re-evaluation was long overdue.

Because of the 1992 convention, the term "traditional knowledge" has gained common currency. Nonetheless, for many people the words "tradition" and "traditional" are highly problematic in this context, suggesting an extreme conservatism

that clings on to that which is outdated, obsolete, antithetical to material improvement, and sometimes even inhumane. While some traditional practices may indeed be fairly depicted this way, tradition has many positive elements.

As a body of knowledge, customs, beliefs and cultural works and expressions handed down from one generation to the next, tradition often forms the “glue” that strengthens social cohesiveness and cultural identity, and provides the underpinning for successful ways of subsisting in what are often hostile natural environments. And “tradition” is not just about the old, the obsolete, and the maladaptive: local knowledge and technologies and traditional cultural expressions can be highly evolutionary, adaptive, and even novel. In short, knowledge held within “traditional” societies can be new as well as old. This should not surprise us. Out of necessity traditional knowledge, often referred to as indigenous or local knowledge, has always had adaptive elements because adaptation is the key to survival in precarious environments. Consequently, while traditional knowledge is handed down from one generation to another, this does not mean that each generation passes on exactly what it inherited. Knowledge develops incrementally, with each generation adding to the stock of knowledge.

Today’s more positive view, which informs the work of Anil Gupta and his colleagues and many other development workers, seriously challenges the idea that knowledge wealth necessarily goes hand in hand with material wealth, and that innovation cannot thrive in the midst of mass poverty. They also point out that knowledge and creative people may be far less scarce than the institutions that can help convert knowledge into wealth for local people and for the benefit of the wider economy. Consequently, traditional knowledge and local innovations are being underutilized.

Let us consider some evidence for three propositions concerning “traditional” societies, which Gupta’s work appears to support. First, many such societies possess a wealth of useful traditional knowledge. Second, individuals within them continue to generate innovative solutions to the daily challenges they face. Third, efforts to enhance the practical use of traditional knowledge and local innovations are hampered by the lack of appropriate institutional support.

A note on terminology. Since it has become an accepted term I use “traditional knowledge” in this article. However, it sounds oxymoronic to use “traditional innovation” to refer to new or scarce applied knowledge. Therefore I also use the term “local innovation” for such categories of knowledge.

KNOWLEDGE WEALTH IN POOR COMMUNITIES

When facing an issue in health or agriculture, peasant communities can often draw on a huge body of knowledge passed on through many generations. The same applies to hunters and gatherers. Much of this knowledge is not written down and is communicated orally, often encoded in practical everyday non-technical language but sometimes as mythology, and passed on through generations of people occupying the same places. As Rosemary Coombe explains, traditional knowledge

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“may involve beliefs that would appear ‘superstitious’ or ‘primitive’ to an outsider. Zapotec science, for instance, is heavily informed by spiritual beliefs but encodes insights that are empirically accurate, sophisticated, and pragmatic. The traditional knowledge of Athapaskans and Australian aboriginals has allowed those peoples to survive as hunters and gatherers in marginalized environments, and it has become legally obligatory in many jurisdictions to consult with holders of this knowledge in formulating environmental impact assessments.”⁵

According to the World Health Organization, up to 80 percent of the developing world’s population depends on traditional medicine to meet its primary health needs. While the high cost of pharmaceuticals must partly explain this high figure, traditional medicine is actually preferable for many ailments, even among urban dwellers. But does it work? Certainly not all of it does, as scientists can no doubt testify. Even so, we must be cautious in validating traditional medicine purely on the basis that it has inspired the development of many modern drugs because we do not want to imply that remedies not yet so validated must therefore not work. Indeed, investigating traditional remedies in the laboratory will not necessarily reveal how they work. As Correa explains, traditional medicine “encompasses a great variety of *methods* of diagnosis and treatment, including physical, mental and spiritual therapies. The application of such methods is strongly influenced by the culture and beliefs dominant in a particular community, to the extent that they may be ineffective when applied in a different context.”⁶ Nonetheless, it is striking that, according to a study in the 1980s, of the 119 plant-based compounds used in modern medicine worldwide, 74 percent have the same or related uses as the medicinal plants from which they were derived.⁷ As Gupta argues, traditional knowledge holders and scientists both have much to gain from working together. For example, local healers can provide leads to potential new drugs. Scientists can test traditional remedies and devise ways to improve their effectiveness and scale up production of herbal medicines for local use and sale.

Turning to agriculture, traditional cultivation systems based on extensive knowledge of natural processes have enabled millions of people to subsist in very hostile environments for thousands of years. According to Brokensha, “African farmers developed an extensive and deep body of knowledge about those resources. This knowledge had evolved over the years and was based on rational observation and experimentation.”⁸ The same may be said for many traditional farmers elsewhere in the world.

NEW SOLUTIONS TO NEW CHALLENGES

Traditional societies are not just storehouses of old knowledge handed down through the generations. The circumstances that rural communities face can change drastically and people must try to adapt in creative ways. For example, extreme weather conditions caused by climate change, outbreaks of crop disease, new epidemics, and globalization all pose sudden and unexpected challenges. Community members do not always respond successfully, but often they do man-

age to combine existing local knowledge with innovations from elsewhere, and in novel ways.

Paul Richards explains how members of Mende farming communities in Sierra Leone effectively continue to manage agricultural genetic diversity, as they experiment on-farm with traditional *and modern* rice varieties, and produce their own varieties that often perform better than those provided by agricultural extension services.⁹ His findings lead Richards to note the common assumption that “poor agrarian districts of the globe are rich in biodiversity and poor in human resources” and that “scientific breeding, undertaken by a remote elite on behalf of the poor, is one way round this assumed poverty of human resources.” The normal response, then, is that “breeders make the clever choices, and all farmers do is plant what they provide.” On the contrary, he considers that the problem may be conceived wrongly; in fact the Mende show us “that the human capacity to combine, select and screen planting materials is locally present in hyper-abundance.” Humankind can gain much, he argues, from tapping into this under-exploited capacity.

In his article, Gupta provides many examples that illustrate the creativity of individuals in traditional societies. Laudably, he tries to ensure that such people are accorded the recognition and respect they deserve both within their communities and outside, as well as the attribution necessary to pursue legal claims to their ideas. In doing so he departs from the more conventional assumption that traditional knowledge and local innovations are produced, held, and transmitted collectively, and only collectively. Gupta is interested in the “individual” as much as in the “community,” and this makes his work especially original and interesting. Indeed, he actively seeks out non-conformists who think differently from their neighbors—and he seems to find plenty of them.

INSTITUTIONAL WEAKNESSES

Local knowledge holders and innovators tend to be poor. Obvious problems keep them from being able to exploit the wealth-generating potential of their knowledge and innovations. Finance and credit are generally unavailable to poor people, especially in rural areas. They often lack secure property rights to land, and enforceable intellectual property rights to knowledge. In some countries, rules require businesses to share the benefits arising from their commercial use of local knowledge and innovations with the local people. But rural people rarely have any idea of their legal entitlements in this regard and have little experience in negotiating with industry. Infrastructure, like good transport links, is often inadequate. And people have few opportunities to exchange knowledge and innovations with others facing similar development-related challenges outside their locality and their nation. This is important, as innovative environments tend to be those where knowledge can flourish and flow without more restriction than is necessary to ensure that innovators get a fair return.

Countless examples illustrate the problems. A study in Western Niger,¹⁰ which

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surveyed two mixed-farming communities not far from the capital of Niamey, highlights some of the challenges. Farmers there have a comprehensive and accurate knowledge of the soils and soil fertility management, cultivation, forestry, and animal husbandry. But financial limitations keep them from applying their knowledge on a greater scale, as do other constraints like the systems governing land tenure and livestock ownership. Many development workers around the world have similar stories to tell.

Gupta's work deals with at least four areas of institutional deficiency.¹¹ First, poor nations lack financial services including access to venture capital. Second, policymakers worldwide have failed almost completely to come up with effective and workable norms for sharing benefits.¹² Nor have traditional knowledge holders and local innovators been able to establish rules of engagement with industry; they cannot secure favorable agreements for knowledge and technology transfer. Third, local innovators cannot acquire intellectual property protection. The lack of legally enforceable rights makes it more difficult to respond to cases of misappropriation. It may also make it harder to secure favorable benefits when they share their knowledge with industry. Fourth, inadequate opportunities exist for knowledge networking between individuals, communities, scientists, and businesses, a process that can spur innovation and benefit everyone. Let us look at these in turn.

Gupta's Society for Research and Initiatives for Sustainable Technologies and Institutions, which receives financial support from many domestic and international sources, has as part of its mission "to provide support including micro venture capital to the local innovators to scale up products and services based on grassroots innovations through commercial and non-commercial channels." Like all good innovators, Gupta immediately leads us to wonder why no one thought of this before. Perhaps the subject of traditional knowledge protection has become too ideological and political; the debates tend to steer well clear of practical measures that might actually work, including obvious ones.

As to the lack of workable benefit-sharing norms, Gupta describes some licensing deals involving innovators and companies. Such deals are of course normal ways of doing business. What is unusual is that the local people are not only involved but are the ones transferring the technology. The excellent idea of documenting innovations, storing them on a database and publicizing them through newsletters is attracting interest from scientists, companies, and investors. It also makes it possible to verify the novelty of innovations and assess their commercial potential. Of course, it could also facilitate misappropriation if access to the database is not carefully controlled. But Gupta is no doubt aware of this danger.

Benefiting depends not only on the availability of legal rights that are enforceable beyond the locality, but also on specific capacity-building measures to address problems of lack of information and production and marketing weaknesses. Table 1 offers a few possible measures.

Intellectual property is a particularly knotty issue. Patents are usually expensive to acquire. And enforcing them in the courts is prohibitively costly even for many businesses. From a policy perspective it may well be preferable to diffuse

knowledge rather than try to keep it scarce through secrecy. Yet, as Gupta would no doubt counter, it does not follow that we should deny individuals the right to control their inventions and make money from them. Indeed, Gupta's organization has helped local innovators to file patents in India and elsewhere including the United States. And he is right that diffusion and the granting of legal rights are not necessarily in conflict and may in fact be mutually supporting, especially when diffusion requires the prior informed consent of the innovators.

This is, to say the least, an unfashionable strategy. Some people would say that nothing new comes out of traditional societies so it is pointless trying to use the patent system. Others argue, more plausibly, that in many societies it is culturally inappropriate for individuals to secure legal monopoly protection over knowledge. This is often true, although such views can sound patronizing, suggesting as they may that "primitive" people, no matter how poor, are too noble to claim property rights to their knowledge or even to make money from it. But who can be more pragmatic than people who wonder how to pay for their family's next meal?

The debate over intellectual property for traditional knowledge is part of a much wider debate arising out of a reasonable concern: that the intellectual property model being promoted around the world by the United States and Europe unduly prioritizes corporate rights to knowledge and innovation over the interests of the public. The solution is not necessarily to go the other extreme, to oppose intellectual property and seek to make knowledge and innovation openly and freely available to all, even when it belongs to individuals.

Anupam Chander and Madharu Sunder, both at the University of California, Davis, are concerned about what they call "the increasingly binary tenor of current intellectual property debates," as it requires us to "choose *either* intellectual property *or* the public domain," and it "obscures other important interests, options, critiques, and claims for justice that are embedded in many new claims for property rights."¹³ Though a debate like this may be extremely relevant to western societies, we should indeed be very careful to avoid imposing it on other populations whose socio-economic situations and values may be very different, and if doing so reduces their freedom to act in ways that are more deeply rooted in their cultures. As Rosemary Coombe explains,

...absolute rights of private property and absolute rights of access to the public domain entertain only extreme points of a Eurocentric spectrum of possibility that needs to be challenged by the cultural mores of others. Peoples have other relationships to cultural forms—trust, secrecy, guardianship, stewardship, initiation, sacralization—and obligations to relatives, ancestors, spirits, and future generations which make models of access and ownership appear extremely impoverished.¹⁴

This is a complex issue, and cannot be resolved in this short article. But as a pragmatist, Gupta wisely avoids taking sides in the intellectual property versus public domain debate; like those on the pro-intellectual property side, he clearly considers intellectual property protection to be a useful tool. In fact, he defended W.R.

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	NATIONAL LEVEL	
	Production and marketing weaknesses	Lack of information
General challenges		
Specific challenges		
Responses		
Possible sources of support		
	Production and marketing weaknesses	Production and marketing weaknesses
	<p>lack of awareness of product and import regulations in foreign countries</p> <p>lack of capacity to standardize, scale up, package, and market products</p> <p>possibility of legal restraints on sustainable harvesting of biological resources</p> <p>lack of funds</p> <p>developing inter-community producer associations</p> <p>developing equitable community-business partnerships (where appropriate)</p> <p>providing technical support and equipment</p> <p>establishing certification procedures to guarantee that products are made by traditional communities and enhance their commercial value</p> <p>using IPR-related and other marketing tools to secure good prices</p> <p>providing venture capital funds for local innovations</p> <p>establishing trust funds</p>	<p>lack of awareness about the importance of using TK/LI for sustainable development</p> <p>lack of information on rights and responsibilities relating to LK that are not in the public domain</p> <p>training courses to raise awareness of TK/LI</p> <p>conducting economic studies on the value of TK/LI</p>
	Lack of information	Lack of information
	<p>identifying TK/LI with commercial applications</p> <p>identifying types of products with stable markets and good prices</p> <p>identifying financial and other needs</p> <p>finding information on import and product regulations in overseas markets</p> <p>Providing training courses with information on:</p> <p>national and international natural product markets including relevant regulations</p> <p>ways that government export promotion agencies can assist communities</p> <p>relevant experiences of other communities and grassroots organizations</p> <p>potential sources of outside funding</p> <p>the legal rights of indigenous and local communities</p> <p>ways to negotiate with scientific institutions and companies</p>	<p>Government; overseas financial institutions; overseas development agencies</p>
	Production and marketing weaknesses	Production and marketing weaknesses
	<p>Government; overseas development agencies etc.</p>	<p>Government; overseas financial institutions; overseas development agencies</p>

Table 1: Harnessing traditional knowledge (TK) and local innovations (LI) for development: Capacity-building challenges and responses.

Grace when, to the disgust of many Indians who considered it “biopiracy,” it acquired a United States patent on a pesticide formulation based on the neem-tree extracts that millions of Indian farmers use to protect their crops.

Still, the main thrust of Gupta’s work is not to file patents on behalf of innovators but to ensure that innovations are diffused to those places where they are most useful, whether or not they are legally protected. This emphasis on dissemination by no means places him solidly in the “pro-IP camp.” But the strings attached to such diffusion also place him some distance away from the “public domain camp.” Innovators must be acknowledged and have the right to say no to commercialization.

One question remains unanswered: How can local innovators in India possibly benefit from filing patents in the United States, as some have? It is expensive. And it is hard to see why anyone there would be interested in commercializing those particular innovations, which include a bullock cart and a motorcycle-based tractor. It is surely far better to file patents in those countries where people will likely demand such innovations—most likely in developing countries.

Knowledge networking is very important to Gupta. This is as it should be, and here he is most innovative. By bringing together the ideas of local innovators around the world, and making it possible for such individuals to exchange their ideas, he encourages both the dissemination of existing innovations to the places where they are most needed, and the production of new innovations. He also seeks ways to bring together local people, scientists, and companies, a unique and highly laudable effort.

In 1999 Gupta successfully lobbied the Indian government to establish a National Innovation Foundation to give his mission a stronger institutional foundation and to extend and deepen the geographical scope of his work. No other government has made such a significant official commitment to harnessing traditional knowledge and local innovations for sustainable development. Given that many traditional societies are rich sources of innovation, India’s initiative merits investigation by policymakers and development agencies elsewhere in the world. Thankfully, as Gupta notes, the rest of the world is listening and several countries are now exploring the possibility of following India’s example.

CONCLUSION

The resilience and adaptability of traditional societies have enabled hundreds of millions of people past and present to live worthwhile lives. This is becoming more widely recognized. But in the face of intense social change, often imposed from outside, local knowledge is rapidly being lost; while it is being replaced by new knowledge, it is not being saved quickly enough. Many factors contribute to this state of affairs; among them are migration, rapid social-economic change accompanied by deskilling, the spread of market economies that commercialize agriculture by introducing export crops and Green Revolution technologies, all-too-prevalent assumptions that Western agricultural techniques and methods are

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superior to local ones, the imposition of inappropriate laws and regulations by governments, and of course war.

This situation is a tragedy. The bathwater is being thrown out along with the baby, and development opportunities are being squandered. Moreover, as rural populations find it harder and harder to live on the land, they are moving at an unprecedented rate to the cities, where insufficient jobs are being created to absorb them. We must find ways to make rural life more tolerable. Two key approaches are encouraging the wider use of local innovations and harnessing people's creative capacities to produce new ones. Gupta's prescriptions are practical and he is clearly an optimist. He believes in the abilities of poor rural people to innovate their way out of poverty as long as they are given the right kinds of support. Doubters, who are legion, are skeptical that local innovators can engage with the wider economy without being exploited. I very much want him to be right.

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