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Unfolding the challenges of delegating research services for innovation and entrepreneurship in smallholder agriculture

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In recent decades competitive research grants are promoted in low-income countries to delegate public provisioning of research services, often considering this approach as an effective way to create knowledge, to generate innovation, to increase aid effectiveness and to enhance overall development impacts. However, as with any other mechanisms of funding, the effectiveness of competitive research funding varies in terms of the delegation of research execution along the continuum of researchers' total freedom to funding agencies' absolute direction. A case study of decade-long Nepalese experience shows that disbursing competitive research grants to promote multi-stakeholder collaboration, as often expected under the pluralist realm, is paradoxical with a focus on either curiosity-oriented or user-inspired research, particularly in low-income countries where stakeholders are becoming critically consciousness of lasting structural inequalities. The paper concludes that there is need first to reform the grant administration procedure for underrepresented communities of scholars, and, second, to develop the capacity of grant administrators as well as researchers, practitioners and entrepreneurs to collectively address the dialectics of delegating research and other innovation services. This can be done by simplifying fund allocation procedure and diversifying the funding mechanisms, to make funds available for the following purpose: (1) curiosity-oriented agricultural science research of strategic importance; (2) applied interdisciplinary research for development problem-solving; and (3) collaborative research for innovation generation and small enterprise development.

Introduction

In recent decades, donor agencies as well as recipient governments have emphasized competitive research funding to facilitate multi-stakeholder collaboration yet with an implicit assumption that the research is the main source of innovation and entrepreneurship, and this mechanism of public funding can serve as a panacea to enhance aid effectiveness, creating lasting development impacts. Although this narrow perspective on innovation have been challenged by the recent application of innovation systems thinking to address the inherent complexity of international development, research financing is one of the least explored areas (Hall *et al*. 2001, World Bank 2006, Hall *et al*. 2009). We agree that increasing aid effectiveness can have leverage in the international development in general and in the livelihoods of vulnerable people in particular, but separating funding and provisioning roles through delegation of research services that have been conventionally provided by the state is a dialectical process. The process of handing over research services without the voice of disadvantaged stakeholders can limit development impacts.

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To comprehend the development impacts of research funding, it is useful to understand the conceptual difference between invention and innovation. Joseph Schumpeter (1939) argues that invention and innovation are two distinct processes, the latter being more important for the economy because all inventions may not be possible to commercialize. However, Vernon Ruttan (1959) suggests eliminating such a distinction: when greater precision is required, innovation can be preceded by an appropriate adjective, such as scientific innovation to represent scientific discoveries and inventions, and technological innovation to signify commercial application of inventions. Although this paper acknowledges this conceptual dialogue, we believe that invention is novelty to the entire world while innovation is novelty to a particular location and time, a human community or a domain of application, such as small enterprise development. Therefore, innovation is not just about scientific innovation but more importantly about technological and social innovation, the latter being as diverse as new organizational structures, multi-stakeholder networks, science and innovation policy changes, cultural shift, changes in mind sets, new enterprise development and market formation. This conceptual broadening of innovation has been well recognized in recent approaches to applying the complex systems thinking into international development, such as the innovation systems approach (Pant and Hambly-Odame 2009a, Hall and Clark 2010). In spite of this conceptual broadening, 'financial systems' are often under-explored. A particular case in point is the lack of scientific evidence on the impact of competitive research grants on innovation generation and enterprise development in smallholder agriculture.

While bridging the above knowledge gap, this research addresses procedural limitations of competitive research funding, particularly the challenges of delegating research services to non-state actors, who can potentially engage in 'provisioning' and 'self-provisioning' of such services to effectively promote innovation and entrepreneurship. Unlike business innovations that are spurred on by profits, social innovations, typical of most international development efforts, are driven by altruism; the critical distinction lies on the phenomenon of value proposition – individual profit versus social welfare (Martin and Osberg 2007). Social entrepreneurs' value proposition targets an underserved, neglected, or highly disadvantaged community that lacks the financial means or political power to achieve transformative benefits on its own. Competitive research grants in particular can be biased in favour of large institutions and established researchers, overlooking the transformative potential of the disadvantaged communities of scholars because it often believed that there is a high risk and uncertainty of delegating research services, including knowledge creation and innovation generation, to lesser-known institutions and new scholars (Elliott and Echeverría 2000, Echeverria and Elliott 2002). In this sense funding agencies are not much different than commercial banks because disadvantaged communities and scholars are excluded from both realms of financing in innovation systems (Braun 1998).[1]

We specifically recognize the flaw of competitive grants to pick winners in advance based on the peer review, and argue in favour of diversifying the modes of delegation to retain and/or to attract young scholars and entrepreneurs in low-income countries and rural communities. The paper aims to investigate financial aspects of innovation systems, particularly how competitive research grants, work along the continuum of researchers' total freedom to funding agencies' absolute direction. In light of the special issue, this corresponds with a key focus on research funding within innovation systems literature studying the relationship between research and innovation (e.g. Klerkx and Leeuwis 2008a, Hall *et al*. 2009): the relationship between institutional mechanisms, such as incentives and rewards for researchers, funding mechanisms, and the contribution of research to innovation generation and enterprise development. The specific research questions are as

follows: why is competitive research funding preferred over core institutional funding in low-income countries often considering it as a panacea of increasing aid effectiveness? Whether and how does the peer review process of competitive research grants help select project proposals that can bridge the conventional divide between research and innovation? Whether and how does a diversity of funding mechanisms with various degree of separation between funding and provisioning services coexist within a research funding agency?

The following section reviews the literature on science and innovation policy, with specific emphasis on the role of various modes of delegating research services. In section 3, we bring a longitudinal case study of the National Agricultural Research and Development Fund (NARDF), Nepal's single most competitive funding agency in agriculture established in 2001 under the support of the British Department for International Development (DFID), to address the above research questions and to discuss why and how the system evolved over the last decade. The findings will be useful for other low-income agrarian countries to (re)design the competitive grant systems, for donor agencies to modify their aid administration strategies to better align with the needs of recipient countries, and for science and innovation policy scholars to articulate better research questions, particularly on the dialectics of delegating research and other innovation services to multiple stakeholders. Section 4 presents a set of capacity development measures to improve the incentive-based delegation of research services, and also provides a typology of research strategy to facilitate knowledge creation and innovation management as a systemic process of increasing aid effectiveness, and the final section draws conclusions.

Theoretical framework: delegation of research services

Science and innovation policy dialogue on enhancing development impacts of agricultural research is related to various mechanisms to fund the processes of generating new ideas, transforming scientific creativity into promising technologies, commercializing such technologies and developing enterprises (Slipersæter *et al*. 2007). While creativity is new ways of thinking, innovation is new ways of doing things, which bring new ideas into practice or combine existing and emerging ideas into new forms of practice – new products, new processes, and new forms of organizational structures and institutional set-ups (Ruttan 1959, Rosenberg 1982, Wallance 1982, Shapiro 2002, Rogers 2003). As the works by several authors (e.g. Braun 2003, Klerkx and Leeuwis 2008a) show, the institutional aspect of research funding systems and its different steps, such as research query generation, priority setting, decision making, monitoring and evaluation, are important determinants for the outcomes of research in terms of effective support of innovation generation and enterprise development.

Public funding agencies in low-income countries, often under the influence of international donors, have experimented with various mechanisms of delegating research services, separating funding from provisioning services, such as research to create new knowledge and/or to combine new and existing knowledge to generate innovation in the form of new products, new processes and new institutional arrangements.[2] Two most common mechanisms of research funding are 'institutional block grants' and 'competitive project funds' although there are context specific modifications of these funding mechanisms. While core institutional funding involves unconditional transfer of financial resources based on a predetermined formula, project funding entails a sum of money attributed to an individual or a team to perform a research activity limited in scope, budget and timeframe, normally on the basis of solicited or unsolicited submission of project proposals with a priori description of intended activities (Lepori *et al*. 2007).

During the last few decades, although its share is still the second most, project funding is preferred over institutional block funds, and they are often universally considered as an effective science and innovation policy instrument to increase aid effectiveness separating funding and provisioning roles, and promoting collaboration among public and private institutions involved in research policy and practice domains (Echeverría 1998, Elliott and Echeverria 2000, Echeverria and Elliott 2002). In his analysis of research policy, Braun (2003) identifies five models of delegating research services (Table 1). While the blind delegation, which has gradually disappeared in developed countries after the structural adjustment policy of the second-half of the twentieth century, provides scientists an opportunity to conduct curiosity-oriented 'blue-sky' research, incentive-based delegation focuses on a relatively more directed funding based on the research priorities identified by funding agencies (Poti and Reale 2007). Although incentive-based delegation is conventionally expected to facilitate user-inspired applied interdisciplinary research to generate practical solutions in the practice domain, competitive funds based on this mode of delegation is becoming less relevant for innovation and enterprise development, particularly in low-income countries, as research priorities are often set by the funding agencies (Heemskerk *et al*. 2009). Moreover, investment decisions for a diverse provisioning services for innovation and entrepreneurship, such as technology, capital, access to input and produce markets, legal services and relevant human resource competence, can seldom be made through the conventional peer review process of the incentive-based competitive grant administration (Hall *et al*. 2009). As well, the short-term project-bound nature of competitive funds neither provide unrestricted funds, allowing researchers total freedom to conduct curiosity based blue-sky research leading to potentially groundbreaking results nor allow applied researchers to engage in participatory action research of emergent problems that are almost impossible to articulate a priori in a project proposal (Braben 2002).

Aimed at addressing the 'policy paradox' of curiosity-oriented blue-sky research and user-inspired applied interdisciplinary research, the steady state delegation attempts to manipulate the relative importance of curiosity-oriented and user-inspired research under a relatively more directed funding, and yet implicit on reducing the scope of curiosity-oriented research as priorities are set by funding agencies. Apparently, this mode of delegation has not worked as a solution to the policy paradox, but aims to make funding

Table 1. Modes of delegation of research services.

Mode	Brief explanation	Key performance measure
Blind	All rights to decide, to act and control are delegated to scientists.	Scientific publications.
Incentive	Scientists' rights to do curiosity-oriented blue-sky research are limited through a more directed funding.	Practical solutions presented in research reports/advisory services.
Steady state	A manipulation of the relative importance of curiosity-oriented and user-inspired research under a more directed funding.	Efficient use of resources and practical solutions.
Contract	Introduces a relational contract between the principal and the agent.	Thorough evaluation of output defined and operationalized in contract.
Networks	Rights to decide, to act and to control are delegated to the members of a network.	Process-related measures concerning network quality.

Source: Braun (2003).

agencies and scientists more response to the practice domain. The contract delegation, a recent incarnation of incentive-based delegation, not only makes scientists responsive to the practice domain but also increase their accountability to the funding agency under a formal contract. Examples of contract-based delegation include alternative, yet competitive, funding mechanisms, such as contract research and commissioned papers (Vera-Cruz *et al*. 2008, Birdsall *et al*. 2010). Two other modifications of competitive grant allocation mechanisms are advance market commitments and proportional prizes. Advance market commitment, which has been successfully implemented in vaccine development, involves creating a market for a product with emergent but uncertain demand (Masters and Delbecq 2008). Proportional prizes, which involve a new kind of technology contest providing a royalty-like payment for the success of innovators, can help modify conventional competitive grant mechanisms, where winners take all funds through competition, by dividing available funds among multiple winners in proportion to measured achievement of development impacts. Both advance market commitments and proportional prizes are not only free from the flaw of picking winners in advance based on the peer review of project proposal, but also align with the recent call for user-inspired research (García and Sanz-Menéndez 2005, Elliott 2010).

Finally, delegation to networks is characterized as a mechanism to facilitate research in complex adaptive systems where both scientists' curiosity as well as users' inspiration are emergent in nature in response to the problem arising from unexpected changes in economic, social, and ecological contexts. While delegation by contract still assumes the state's key role to steer scientific endeavour, the delegation to networks takes the conventional role of the state back to the civil society (Braun 2003, Klerkx and Leeuwis 2008b, Poti and Reale 2007, Lepori 2011). While delegation to networks is potentially useful to transform the role of the funding agency into a facilitator of self-organizing networks, Klerkx and Leeuwis (2008b) caution that this mode of delegation can serve as a source of tension not only between the funding agency and a diverse group of actors but also among these network actors themselves. Tensions over dialectical divides, such as prioritizing basic strategic research and applied interdisciplinary research, arise due to different stakeholder views in the domains of priority setting, selection of grantees and evaluation of performance for subsequent funding (Pant and Hambly-Odame 2006). For example, scientists would argue for a complete freedom to conduct curiosity-based research, practitioners would be in favour of user-inspired research, and funding agencies would still be interested to make grantees accountable to their top-down research priorities.

Case study: a decade-long experience of Nepal's competitive grant systems

Nepal, a tiny least developed mountainous country in South Asia with politically unstable and biophysically and socio-culturally diverse terrain, has a small research and innovation system, which overly depends on foreign aid. The total population of the country is 28 million of which 30.90% are living below the national poverty line – the total annual per capita consumption based on a food consumption basket of 2,124 calories and a two-thirds allowance of the cost of the basket for non-food items – 55.10% earning less than $1.25, and 77.60% earning less than US$ 2 a day (UNDP 2009). In spite of the engagement of 66% of the labour force in agriculture, which does not include minor and senior farm workers, the country, which used to export cereal grains until the 1970s, is now a net importer. Responding to a dire need of the country, various bilateral and multilateral donors have generously contributed to Nepal's agricultural research and development.[3]

During the second-half of the twentieth century, the UK Government established two independent agricultural research centres, the Lumle Agriculture Research Centre (LARC) and Pakhribas Agriculture Centre (PAC) in the western and eastern hills of Nepal, respectively.[4] Later during the mid-1990s, soon after the Nepal Agricultural Research Council (NARC) became an independent research council in 1992, these centres were incorporated into to the council, a strategy also consistent with phasing out the blue-sky research in response to reduced public funding and broader structural adjustment policy in Nepal.

For the smooth handover of the research centres to NARC in the 1990s, some part of the research funds of DFID were used through the Hill Agriculture Research Project (HARP), which funded competitive research projects on hill agriculture and livestock (Abington 2000). Nepal Government established competitive grants for agricultural research in 2001 in the name of NARDF under the Ministry of Agriculture and Cooperatives (MoAC). Initially it was expected that this mechanism of resource allocation would enhance aid effectiveness through better priority setting, increased local ownership through broad-based stakeholder participation, results-based and problem-oriented research, performance-based management and mutual accountability in the agricultural sector, the mainstay of the livelihoods of over 80% of people in the country.

Research method

The research method we employed is a strategic deviation from what mainstream researchers at the outset would think scientifically credible. Since both of us, in our capacity as not only collaborators on this research but also siblings – where the latter relationship might have influenced this research – have a direct experience of the national agricultural research and extension system of Nepal. We were critically conscious about the functioning of NARDF as a new entity within the existing system entrenched in top-down research priority setting. But the research idea itself remained naïve, and kept on emerging for several years until the second author had had an opportunity to join NARDF's senior management team, although it was only for two years from July 2007 to March 2010, before he returned to the ministry. However, the preliminary informal interviews began as early as 2006 as a part of the first author's doctoral field research on agricultural innovation (Pant 2009, Pant and Hambly-Odame 2009a, 2009b). As a formal research process, we reviewed official documents, conducted further informal interviews with NARDF staff and grant recipients, and reflected on what the second author directly observed as an insider over the two cycles of grant administration. Methodologically, these emergent research processes can be characterized as a modified participant observation because maintaining complete objectivity as a researcher was only possible after the second author returned to the ministry, which is a classical problem of participant observation where it is a paradoxical challenge to maintain objectivity while participating in the inherently subjective real-life experience of research participants (Spradley 1980). The official documentation of grant administration procedure was triangulated with information generated through interviews and direct observation, particularly to increase the reliability of longitudinal data generated through the review of archival documents that have been available since the establishment of NARDF in 2001.

The research questions and analytical framework presented in the previous sections remained emergent throughout the research process as is often common in grounded theory methods (Glaser and Strauss 1967). As articulated by Bryant and Charmaz (2007), initially we did not intend to use grounded theory methods although the research process was purely inductive. Now it has become evident that they are indeed grounded theory methods as we first collected a thick data set, enough to write a detailed case study, to inform the theory

of delegating research services. As Babbie (1992) suggests, this was a two-way process of inductive and deductive reasoning.

Research results

In Nepal, there have been lasting agricultural research policy tensions regarding institutional block funding and competitive funding. As described above, NARDF was established in order to manage and operationalize competitive research funding, initially an exit strategy of HARP. With the increasing number and diversity of the public and private actors in agricultural research and development in the country, NARDF strives to facilitate collaboration between private and public sectors through mobilization and allocation of competitive grants although the current share of competitive grants in Nepal's agricultural research spending is only about 10%. The other 90% goes directly to NARC as a block grant. Although one-third of the competitive grants disbursed through NARDF's competitive call also goes to NARC, scientists in the research council often argue that there should not be a separate institution for administering competitive grants that puts them under a pressure of competing with other public and non-profit private institutions (Box 1).

Albeit with the ongoing tension and technical naivety to disburse funds, NARDF has gone through a decade-long journey to institutionalize competitive grants in the country, employing a rigorous five-step procedure of grant administration, which requires project proponents to follow the logical framework approach (Figure 1).

Step 1: setting priorities

The priority setting for each call of the competitive grant system is done through stakeholder consultation on an annual basis. Though the representative of the multiple

Box 1. National research block grant versus competitive grants

Nepal Agriculture Research Council is an autonomous body under the Ministry of Agriculture and Cooperatives with a mandate on agricultural research. This autonomous body has a full stake on agricultural research. The hill agricultural research stations in eastern and western Nepal developed and funded by DFID were merged to NARC. As a transition strategy, DFID funded for a Hill Agriculture Research Project (HARP) that provided funds to the hill agricultural stations, but this time as the competitive grants. When the NARDF was being instituted as the successor of the HARP, it was natural to think that the NARDF will also be instituted within the NARC. Contrary to the expectations of the NARC research system, the NARDF was instituted directly under the Ministry. The rationale behind such institutional development decision is that the competition needs to be on equal footing for the scientists in any institution within the country. The scientists from the NARC need to compete with the researchers from other institutions. It seems reasonable to the merit of competition. However, in practice several problems arise because of the following reasons.

(1) As the system of competition was new to the country and the project screening process was long and cumbersome, NARDF was unable to spend the large part of the fund provided by DFID.
(2) NARC was not getting sufficient funds from the Ministry for conducting the basic agricultural research.
(3) NARC allowed its scientists to compete for the fund from NARDF, but the senior level scientists abstained from competing.
(4) NARDF was administered with technical staff of the ministry experienced in technology extension and with little experiences in research.
(5) A creation of some ambiguity among the common people as the name NARDF sounds similar to NARC.
(6) Politicians often question the NARDF that when there is an institution like NARC for agricultural research in the country, then why a separate institution is needed.

The scientists in the public research system prefer block grants whereas those working in the private sector prefer competitive grants. This is because, the scientists in the national research system have to conduct long-term basic research and those in the private sector are experts of user-inspired applied research. The success in agricultural innovation lies on dovetailing the competitive research into the public research system.

Source: Authors' compilation

stakeholder in the national research system are involved in the priority setting, the priority areas are confined within the six thematic areas that are fixed at the time of establishing the competitive grant system, namely: (1) increasing productivity of farming systems; (2) crop research and extension; (3) livestock and fisheries research and extension; (4) management of natural resources and environment; (5) medicinal and aromatic plants, their domestication, production and value addition; and (6) agricultural trade, agri-business, quality control and policy issues.

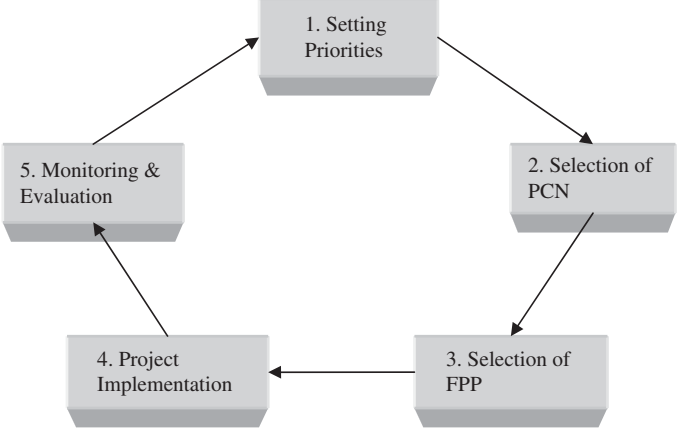

Figure 1. Cycle of competitive grant administration.

Research priority setting is itself a contentious process. Through participant observation of the priority setting process, this study identified five types of tensions. First, the research scope of each priority area can be narrower or wider. Setting relatively wider priorities results in vague proposals difficult to appraise what the research will actually deliver, sometimes adding difficulties in monitoring and evaluation. Conversely, narrower priority fits with disciplinary expertise and specific skills, but limits competition, often curtailing the mission of facilitating broad-based stakeholder collaboration for applied interdisciplinary research. For example, poverty as a priority area can accommodate many things in it whereas yellow rust management in wheat or white grub control is highly disciplinary and limits competition as well as collaboration because there are not even a handful researchers working in these research fields.

Secondly, there were contentions regarding small versus large number of priorities. Small number of priority areas can truncate many potential fields of research pushing back many potential researchers in the area. On the contrary, large number of priorities scatters the efforts to too many areas making the efforts less effective. During early years, NARDF used to have large number of priority areas, as high as 87, but now the priority areas have been down to as low a number as 21 for a call for proposals.

Thirdly, priority can be on production versus post-harvest research. NARDF's main emphasis has been on production-oriented research than the research on post-harvest management (Figure 2). The successful proposal so far has mainly looked at production oriented research and technology development.

Fourthly, although Nepalese smallholder farmers practice livestock integrated agriculture, the successful proposals were more on crops than on livestock (Figure 3). One explanation of this observation is that more number of priorities is set in crop sciences than in livestock and fisheries. A rationale for this neglect is that the number of organizations and individuals working in the livestock sector is relatively lower than those working in

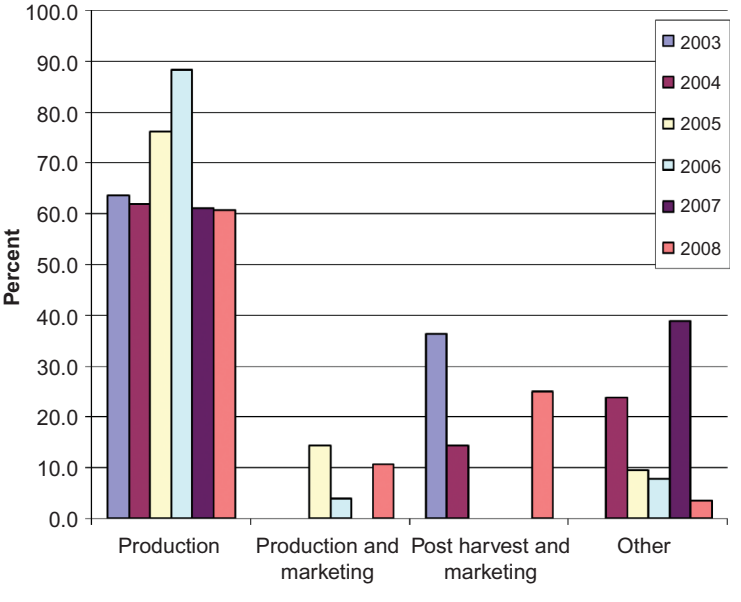

Figure 2. Distribution of winning proposals among various research portfolios over time.

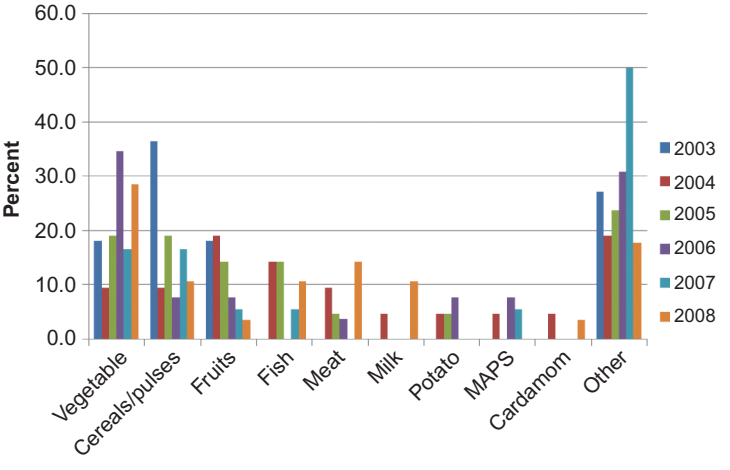

Figure 3. Distribution of winning proposals among various commodity focused research.

the crop sector. But livestock serve as a key source of food and income security for poor people. Being a landlocked country with very small area covered by water, the fisheries sector contributes very little in the economy. But, the number of successful proposals was more in fisheries sector than in the livestock sector. Competitive grants being short-term efforts (maximum of three years) the research areas that take longer to give reliable research results, such as livestock and tree fruits are automatically left. For such research that needs long-term effort, the public research system has been the only suitable answer so far.

Fifthly, the research priority can be of national versus regional relevance. The competitive grant systems mostly announce the calls for national competition. While national competition results in high quality proposals, it was realized that proposals from rural and remote regions were less likely to be selected. To address this challenge, NARDF announced a special call for small grants from 15 backwater districts out of 75 districts in the country from where very few proposals had been successful in the past calls. Not only the response to the regional call was low, the submitted proposals were also of a lower quality based the conventional review results.

All in all, the priority areas for each annual call were the results of the interplay of a diversity of factors illustrated above, which are often addressed in stakeholder consultation. Unfortunately as a typical practice in government institutions in Nepal, hierarchy often dominates the expertise in such consultations; thus a genuine stakeholder consultation was far from the reality. As a result, the funded projects were less effective to address user-inspired research problems.

Step 2: selection of project concept notes

The project proposals are selected in two stages: full project proposals are invited only after the review of Project Concept Notes (PCNs). The PCN selection process comprises a call for concept notes, pre-screening, peer review and acceptance. The call for PCNs specifies the priority areas, budget limits, time frames, eligibility of the proponents, and other conditions, such as mode of submission and additional documentations to be submitted. The priority areas are divided into three groups based on the budget requirement. For some

simpler areas of research, the budget is Nepalese Rupees (NRs) one million (US$14, 000), for some other priority areas it is NRs two million. For those projects that require larger research team and budget, the budget ceiling is NRs three million.

Among the large number of the PCNs received (around 370 for each call) the secretariat pre-screens the concept notes to check whether they are complete and the minimum set of criteria are fulfilled. A unique code with a single coding system is assigned to each complete and valid concept note to maintain anonymity of the proponents. Then the coded concept notes are sent to the peer reviewers. A panel of peer reviewers for each discipline (crops, plants protection, soil, livestock, fisheries, agricultural extension, agricultural economics, etc.) is selected by the Fund Management Committee (FMC) led by the Secretary of the Ministry of Agriculture and Cooperatives. Each of the PCN is reviewed anonymously by three peer reviewers – two from the discipline concerned to assess the technical content, and one interdisciplinary reviewer to assess wider social, economic and environmental issues – using a seven point criteria.[5] The reviewers either recommend for acceptance with minor revisions (category A), acceptance with major revisions (B) or rejection (C). Comments and recommendations from peer reviewers are compiled and presented to the nine-member Technical Sub-Committee (TSC): two of them are from the Secretariat and seven are appointed by the FMC on a three-year term. The technical committee recommends selected concept notes to the FMC for final approval. The rule of thumb is that for a concept note to get selected none of the three reviewers should award the category C.

The competitive grant system faces several challenges to implement transparent and unbiased peer review process. Firstly, due to the divide of the peer reviewers between researchers and practitioners, sometimes basic research proposals may not be appreciated when the panel of reviewers is dominated by development practitioners, and vice versa. The culture of linking research and development mandates in a single research proposal is very limited. Secondly, the divide between specialist and generalist is also a problem. While disciplinary reviewers can either be emotionally attached to their discipline or may do some efforts to reserve potential research ideas themselves to compete elsewhere, the interdisciplinary reviewers may sometimes fail to appreciate the importance of discipline specific issues.

Thirdly, smallness is not always beautiful. Nepal, being a small country, has few experts in a field and the probable reviewers can be guessed and contacted. Conversely, peer reviewers can guess the proponent by the nature and subject matter of the proposal. The problem of smallness also relates to the challenge of considering proposals from professional associations. NARDF gets some proposals from professional associations of which all the professionals falling under a discipline in the country are members, for example, Veterinary Association, Horticulture Association and Fisheries Association. In such cases, finding an independent reviewer is difficult. Moreover, there is a bias as well as jealousy. Professional bias is often a problem when a reviewer comes from a different professional association, while professional jealousy is a problem when a reviewer comes from the same professional association. Moreover, multiple hats of reviewers and conflicts of interest also pose a challenge. The experts who are recruited in the panel of the reviewers and trained for the peer review often responded as proponents and it is ethically challenging to recognize them as independent reviewers. A condition is that those pre-selected panel of reviewers who are submitting a proposal for a given call cannot work as reviewers for the particular call. The problem of professional bias as well as jealousy can be more serious if the competitive grant system continues using reviewers wearing multiple hats.

Fourthly, besides the professional issues, personal bias can also limit the review process. Perception of the reviewers about the quality and rigour of a concept note would

differ depending on their social and cultural background even if they come from the same disciplinary background. This may lead to an acceptance of inferior proposals and rejection of superior ones. For example, several proposals were rated as category A by two reviewers and C by the third. Similarly, awarding category B necessitates that the peer reviewers should give detailed comments for the major revision of the proposal. Those reviewers who do not like to give substantial comments award either category A giving minor comments or award C giving a brief reason for rejection. In some cases, the reasons for rejection are not substantiated, particularly when the reviewers are influenced by personal bias. In general, it appears that a good peer reviewer with enough knowledge of the subject matter gives elaborate comments for major revision and awards category B, whereas reviewers with either less knowledge or limited time judge the proposal either as category A acceptance with minor revisions or category C rejection. Personal bias can also be against creative proposals. Creativity and innovation is possible through crossing conventional disciplinary and sectoral boundaries. When a proposal is creative going beyond the knowledge of the reviewers, the reviewers may either fail to appreciate it or avoid a possible blame for approving untested ideas for funding.

Fifthly, the competitive grant system often fails to assess the track record of project coordinators and team members as 100% weight is given to the quality of the proposal. The quality of the proposal is often considered enough to award research grants if the minimum requirement of the proponent is met. For the purpose of anonymity, the competitive grant system does not allow the peer reviewers to take into account the expertise of the proponent to select project proposals. It means a person with no or little experience in conducting a research can put a good proposal through outsourcing the proposal writing process to an independent private consultant as is often practiced in several cases, and can win the award.

Sixth, duplication of proposals is a problem as well. The same proposal, with or without reasonable make-ups, sometimes comes from different institutions in the name of different coordinators. Such submissions are done either by the collaborating institutions or by an expert consultant who write proposals for different institutions. Seventh, the review process sometimes reinforces the practice of reinventing the wheel. It is found that there are efforts to replicate already implemented project ideas. There is no way to judge whether a reviewer is up to date to the contemporary research and their findings. A good proposal can be submitted to different grant systems and repeat with little improvement the same research every time they get the grant.

Finally, there is a debate about recruiting reviewers. Identification and recruiting a suitable peer reviewer is not easy. The competitive grant system has no provision of using external reviewers among the experts in other countries, including Nepalese Diaspora working around the globe. As of 2010 there were 200 peer reviewers in the panel of experts. The practice of using these identified panel of the reviewers over a long time limits the system performance, and makes the peer reviewers more predictable to the proponents.

Step 3: selection of full project proposal

Although the proponents of the short-listed concept notes are invited to submit Full Project Proposals (FPPs) within a set deadline, they are not obliged to move to the second state as NARDF does provide project development grants. One of the reasons of the withdrawal at this second stage is that short-listed applicants are required to submit a tax clearance certificate along with the full proposal, which some of the proponents are unable to produce. The FPPs received with complete documentations are sent anonymously to three

peer reviewers after coding as done in the case of PCN using the same evaluation format and criteria.

In addition to the challenges identified above to facilitate the peer review process, two challenges were more evident at the full proposal selection stage. First, the reviewers were often unable to visualize the potential impacts of the research solely through the review of the project proposals. Since the proponents often take the project as a reward for their successful proposal writing skills than the obligations for effective implementation, proposals that sound very good in the peer review may not be able to generate development impacts. Similarly, using the same review criteria for the review of concept note as well as full proposal would overlook the development impacts of the proposed project that have been articulated during the full proposal development stage. Second, the proponents cannot remain anonymous during and after the negotiation of the project contract (see Step 4). As a result of this the decisions of the Technical Sub-committee and Fund Management Committee can have some bias. For example, as typical in a hierarchical organization, junior officers tend to adhere to the command of senior bureaucrats.

Step 4: project agreement and implementation

Once the anonymous review is completed the successful proponents are invited in person for negotiations. The project proponents have to justify the technical contents as well as budget items in a face-to-face meeting with the relevant experts from the TSC and responsible NARDF staff. Depending on the expertise of the expert and secretariat staff the proposal may need further revision. As in the case of concept note selection, the Technical Sub-Committee recommends the selected full proposals to the Fund Management Committee for approval.

The successful project proponent (in NARDF's case, the Project Coordinator) signs an Official Project Agreement on behalf of his/her institution. The fund disbursement process faces several challenges. Firstly, the release of the fund should follow a strict fiscal regulation of the government that is cumbersome in itself. The approved annual budget is reimbursed in quarterly instalments upon receipt of the project progress and verification through monitoring. A bank guarantee is mandatory for the advance payment for the institutions other than the government line agencies. Secondly, weaker law enforcement makes the fund administration difficult. When it experimented with an advance payment of grants for regional competition of small grants, NARDF lost contact with some project proponents and had no means to get the recipient either to finish the work or to return the money. Moreover, project proponents who fail to comply with the prevailing law may not get punished. Thirdly, the legal structure for competitive grant system is not well developed in Nepal. This gives discretionary power to the fund administrators leading to some inferior and biased choices.

Fourthly, there are problems of multi-stakeholder agreements. As elsewhere, broad-based stakeholder collaboration is often cited as a prerequisite for successful proposals (Sunderland *et al*. 2004), and proponents often come from various organizations. But NARDF's project agreements are generally signed only with the Project Coordinator on behalf of the lead institution without a clear budget breakdown to different collaborators. There are frequent complaints from collaborators that the lead institutions after signing the agreement tend to ignore the collaborators. NARDF receives formal and informal complaints from collaborators, but it has very limited role to resolve such conflicts except a benign request to the Project Coordinator to adhere to the approved project proposals. In

some cases, it was also found that the project coordination role is outsourced by the lead institution, which poses a problem in the ownership of the project.

Finally, lead institutions also attempt to change the Project Coordinator once the grant is approved. Some institutions try to change the project coordinator just after the approval of the project whereas some other after halfway through the implementation. There may be several reasons for the request for the change, but the following two are often cited. Either the project coordinator may be unavailable due to staff transfer, retirement or resignation, or there are conflict between the Project Coordinator and the Head of the Institution regarding the terms and conditions. In the first case Project Coordinators could bring their project with them, but they may be unwilling to travel to the project areas that were initially proposed to implement, particularly when the project site is in a rural and remote area. Although the first case is acceptable and handled on a case-by-case basis, the second problem is a difficult one to resolve. Both the parties, the institution and the Project Coordinator, claim to be right and sometimes it is not clear whether the project is awarded to the institution or the individual.

Sept 5: monitoring and evaluation

Regular monitoring and evaluation of the approved projects is the right and responsibility of the funding agency. The monitoring is done with six complementary methods as follows: (1) review of quarterly and annual progress reports that are necessary to reimburse the expenses; (2) issue-based discussion with project coordinators; (3) visiting the project areas and discussions with beneficiaries and project staff; (4) requesting other government institutions for monitoring; (5) cross checking with the collaborators; and (6) hiring an independent consultant for the evaluation of the project activities. Effective monitoring and evaluation is always challenging. It is particularly challenging when large number of multi-year small grants are approved every year. Around 20 to 30 projects are approved every year and the life of a project is of three years at most. Sometimes over 80 projects are to be monitored on a quarterly basis. Field monitoring and making a candid evaluation of the implementation of such a large number of the projects are very difficult, particularly at the times of political conflict and geographical diversity of the country with poor transportation and communication facilities.

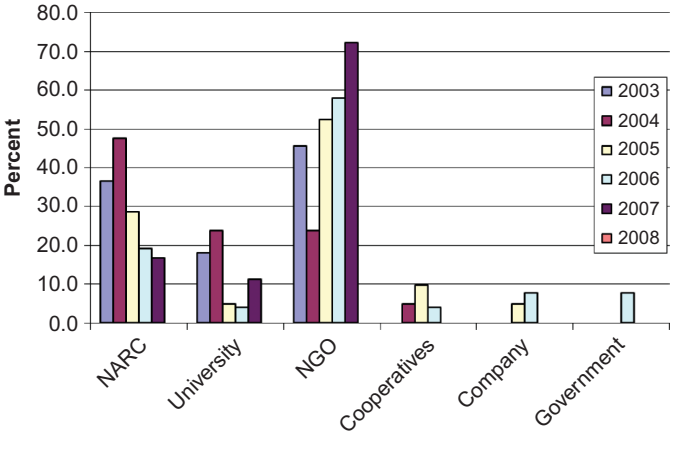

Figure 4. Distribution of winning proposals among various institutions over time.

Table 2. Evolution of institutional collaboration in competitive projects.

	2004		2005		2006		2007		2008	
Actors	L	C	L	C	L	C	L	C	L	C
NARC	ooooo		oooo		oo	o	o	o	oo	
University	oo			o	o		o		o	
Government institutions		oo		ooo	o	ooo		ooo		ooo
Local governments								o		
NGOs	oo	o	oo	oo	o		o	o	oo	
Cooperatives		o		o	o					
Private companies		o	o	oo	o	o			o	o

Notes: L Lead institution, C Collaborator & the number of bubbles in each call estimate the strength of various institutions as the lead implementer and collaborators.

Source: Authors' compilation and estimate.

In spite of the lack of a systematic impact assessment, NARDF claims that there have been positive impacts of competitive grants to mobilize the non-state actors although the major share of the funding still goes to the public sector (Figure 4). There are two main reasons behind this emerging trend. Firstly, professionals from public sector institutions find it increasingly difficult to launch a project from their own institution because of the difficult work environment, and thus circumvent their boss submitting proposals through non-state partners; some of them often form their own non-governmental organizations (NGOs) and community-based organizations (CBOs). Moreover, those public sector professionals who submit proposals through their institutions have often requested to change the lead institution to an NGO to avoid hierarchical and bureaucratic organizational of structure of public institutions and stringent rules of budget handling in public institutions.

Secondly, in confirmation of the above claim of NARDF, it is becoming clear that the competitive grant system has developed the capacity of NGOs. As mentioned above this impact has indeed come from increasing collaboration between professional working in public and private institutions, partly because of difficult work environment in public institutions (Table 2). It means competitive grants have provided a floor for the experts working in the government institutions to work extra hours in relatively flexible environments of the NGOs making them more productive. Thus, in recent years government institutions have appeared more as collaborators than lead proponents. Private companies, small entrepreneurs, and cooperatives, however, were initially appeared as active players but lately they have lost their interest as the processes of grant administration had been inaccessible for small and medium entrepreneurs who lack grant proposal writing skills. With the same reason, involving local government bodies in collaborative projects also remains a challenge.

Discussions: addressing delegation challenges through the diversification of funding mechanisms

The empirical evidence clearly shows that three modes of delegation in public research funding are used in Nepal's agricultural sector: institutional block funding to NARC through blind delegation, incentive-based delegation in NARDF's competitive grant system, and an emerging need for delegation to networks. While there is a need to simplify the competitive grant introducing funding mechanisms as diverse as contract research and commissioned papers, developing the capacity of the grant administrator to experiment

with alternatives, yet competitive, funding mechanisms is also becoming important (following, e.g., Klerkx and Leeuwis 2008b). This section first discusses various ways to develop capacity, first, to make the incentive-based delegation effective, and, second, to experiment with alternative funding mechanisms geared towards providing research services for innovation and small enterprise development.

Capacity development to improve incentive-based competitive research grant systems

Developing the capacity to restructure the incentive-based delegation needs to address the following emergent problems. Firstly, when competition gives more weight to the quality of proposals (e.g. 100% in Nepal), there is no way to account the track record of researchers for grant decision making even when Project Coordinator's CV is reviewed to determine the eligibility of applicants. For regular scholars, considering the local contexts such as in Nepal, the grant administer can experiment with 30% weight to the CVs of team members and 70% weight to the technical quality of the proposals because most of the challenges in project implementation in Nepal had been due to the lack of the capacity of the project team to implement the approved project. This can serve as a mechanism of merit review in addition to the conventional peer review (Vera-Cruz *et al*. 2008).

Secondly, with the increasing unemployment and underemployment of educated human resources in low-income countries of which Nepal is a typical case, new scholars are often encouraged to work as external experts to help write project proposals with a condition that they would be hired as a Project Coordinator if the proposal is successful. As evidenced by the Nepalese case study, this emerging practice creates a problem with the ownership of the project. One way to address this problem is to revise the eligibility condition that Project Coordinator should be the regular employee of the lead institution although this can be discouraging for new unemployed scholars. Thirdly, recognizing the frustration and flight of new scholars, competitive grants should be used as a policy tool to retain and/or attract new scholars and entrepreneurs in the country or in rural and remote communities. There should be a separate funding mechanism for this group of emerging and ambitious scholars and entrepreneurs. One way to address this problem is to allow new scholars to apply for funding irrespective of their institutional affiliation particularly when they apply through community-based organizations, and local government agencies of their communities of origin. There should be a different review process for this group of scholars. For example, the grant administrator can experiment with the new scholar category with the CV and the proposal weighted in the overall score, such that either a 30/70 or 70/30 ratio mentioned above, whichever will result in more scores in favour of new scholars. As well, since stringent rules and formalities put the experienced researchers in advantage over the new scholars, the latter group scholars would benefit from the simplification of the requirement for structure of the proposal and other formalities.

Fourthly, because the proposal development process itself is demanding, potential proponents put efforts in the writing of the proposal if the chance of winning is high, that is, the anticipated benefits outweighs the cost (Lepori 2011). As a rule of thumb, the probability of winning the grant multiplied by the grant amount should be at least 20 times of the costs of developing the proposal. Although NARDF's project proposal selection is a two-stage process, it does not provide development grants for the short-listed team to develop full proposal to offset at least part of the cost. Though we find no literature comparing the efficiency of a two-stage and a single- stage process, in addition to compensating a part of the cost when development grants are available, the two-stage process saves time and

effort of the proponent as well as the funding agency as only short-listed ones go to the full proposal development.

Fifthly, the peer review process in small countries faces a number of challenges, largely as a result of the smallness of the research and innovation systems where a limited number of experts in a discipline work on personal than professional relationships. One way to address this problem is to recognize peer reviewers from outside the country but these reviewers may not be well aware of the local user-inspired research problems. Sixth, unsuccessful proponents of NARDF's grant systems, particularly those at the full project proposal development stage, express their bitter experience and often tend to be confrontational with the grant administrator. Such a problem can be minimized through the provision of development grants so that the proponents feel that they have achieved at least something out of their year-long effort to win the grant. Moreover, face-to-face negotiation may not be feasible when the numbers of funding mechanisms and the number of short-listed proposals increases, which can also minimize the confrontational situations at the personal level particularly when proposals are rejected at the negotiation stage.

Finally, developing stakeholder capacity to work through the establishment of networks, consortia and associations has remained a challenge (mirroring findings by Klerkx and Leeuwis 2008b, Lepori 2011). In spite of its own limited capacity to administer the grants, NARDF has been influential in developing the capacity of the private sector to conduct collaborative research, often in collaboration with public sector professionals. While NARDF faces challenge to commission peer review of project proposals submitted by professional associations, the habits and practices of working in collaboration have been developed to some extent among public and private stakeholders with increasing number of NGOs, CBOs and small businesses providing groundwork for experimenting with delegation to networks. However, this emergent phenomenon of self-organizing network development is concentrated in more accessible areas and thus capacity development of stakeholders in rural and remote areas is imperative.

Strategies to diversify research funding mechanisms

As evident from the case study, competitive funds structurally not only limit an opportunity to conduct curiosity-driven blue-sky research leading to potentially groundbreaking results (Braben 2002), but also unlikely to be socially optimal funding policy because state defined research priorities are less likely to address user-inspired emergent problems unless special calls are made for disadvantaged areas and groups (Huffman and Evenson 2006).[6] Even when the regional calls were issued to address the problems in underrepresented communities, the response was very low, compromising the quality of the selected proposals albeit in terms of the conventional peer review process. Availability of the fund to do curiosity-oriented research by the right person at the right time is necessary, and thus blind delegation of provisioning services with the use of performance-based evaluation and subsequent funding are also required, particularly for long-term strategic science, technology and innovation (Table 3). However, operationalizing blue-sky research strategy is particularly challenging in countries, such as Nepal, where keeping a track record of researchers is difficult, the legal structure is primitive, law enforcement is weak and culturally established work ethics are dwindling.

While institutional grants that have been available to the Nepal Agriculture Research Council through the mechanism of blind delegation could potentially facilitate the blue-sky research, the elitist isolation of the public researchers from the rest of the actors has become a problem to address user-inspired research problems. NARDF was established with a rationale of bridging the conventional gaps between research and practice, but experience has

Table 3. A typology of research strategy.

Blue-sky strategy	Blind delegation in curiosity-driven strategic research funding.Funds unique research ideas with unclear goals, and yet track records of researchers are considered.Ex-ante competition for funding is irrelevant as a breakthrough if happens can generate new funding sources.Facilitate creativity through free roaming.
Red-earth strategy	Incentive-based funding of innovation support services and its modifications.Often funds research priorities of the funding agencies.Compete for the existing resource.The winner takes all funds creating a win-lose situation.Facilitates creativity and innovation in captivity.
Blue-ocean strategy	Delegation to networks in funding of user-inspired emergent research priorities.Enables self-organising and collective processes of knowledge and innovation management for innovation and enterprise development.In addition to research, funds are also generated to access other support services for innovation generation and enterprise development, such as access to credit, input and produce markets, legal services and relevant human resource competence.

Source: Authors.

shown that in most instances NARDF is merely reinventing the wheel. In other words, it engages in red-earth research strategy of funding top-down research priorities that may or may not represent local emergent problems. Thus the following three principles of competitive grants are evident under the theory of incentive-based delegation of research services:

(1) Autonomy in project implementation. The grantees should be free to implement the project in their own way provided the objective of the grant is met at the time specified with certain degree of the quality assurance. It is the professional accountability of the grantees to exhibit utmost sincerity in project implementation, but the research process itself needs to be emerging through self-organization and self-provisioning.
(2) Guided more by the professional ethics than rules of the law. Though a legal contract should be done between the funding agency and grantees with a set of conditions, the project execution needs to be guided more by the ethics than by the legal procedure. The performance of research service providers should be guided through their expectation for the future competition and career advancements.
(3) Periodic monitoring of the project implementation. Donors should periodically monitor the project implementation not just for outputs and impacts but more subtle issues of outcomes, such as positive changes in the behaviour and relationships of diverse groups of stakeholders.

In practice, blue-sky research gives a complete freedom to scientists and competitive projects, in spite of its good intension to facilitate user-inspired research, often embrace the priorities of funding agencies. In response to these limitations of the blue-sky strategy and red-earth strategy, the contemporary need is to facilitate user-inspired research for knowledge and innovation management for small enterprise development through delegation of rights to decide, to act and to control to the members of a network (Braun 2003). Neither scientists nor policymakers would overly influence the research priorities. Thus delegation to networks makes competition over scarce research funding less relevant, if not irrelevant, facilitating self-organizing systems of research, innovation and development, which would

be called 'blue-ocean' research strategy, a metaphor borrowed from the business strategy literature (Chan Kim and Mauborgne 2004, 2005). Thus the outcomes of the funding policy and practice under this strategy would entail not only the creation of knowledge but also the development of networks of actors from public, civil society and small enterprise sector, making such networks, in the long-term, accountable to self-funding and self-provisioning (Lepori 2011).

Although the case study from Nepal as well as evidence from elsewhere (see Klerkx and Leeuwis 2008b) recognize the inherent challenges to facilitate networks, consortia and associations, delegation to networks is becoming a norm, rather than exception, for donor agencies at various levels: for example, since 1992 the International Development Research Centre of Canada (IDRC) has facilitated the Economy and Environment Program for South East Asia (EEPSEA), one of the oldest and most successful networks within the IDRC, followed by the establishment of similar networks in South America, South Asia and Africa.[7] Similarly PROLINNOVA (Promoting Local Innovation), an international partnership program, facilitates the Local Innovation Support Funds in 16 countries in Africa, South America, Asia and the Asia Pacific (Wongtschowski *et al*. 2010). While IDRC's delegation to networks entrusts researchers at the national and regional levels, PROLINNOVA's delegation facilitates networks at the local level, ensuring farmers' control over fund management, making calls for proposals that farmers can easily understand and respond to, developing and applying effective selection criteria, and systematically monitoring and evaluating how the funds are being used, the outputs and outcomes of the projects and the overall development impacts. Engaging farmers and local entrepreneurs in a network together with researchers and practitioners could serve as an effective way to facilitate user-inspired research. Although a client-oriented research management approach was initiated as early as the 1990s, the focus on delegation to networks, recognizing networks as self-organizorganizing, self-sustaining and self-provisioning systems of blue-ocean research strategy, has been a recent focus of research policy (see Merrill-Sands *et al*. 1991, Ashby and Sperling 1995, Heemskerk *et al*. 2003).

Conclusions

Competitive research grants in low-income countries are often considered as an effective funding mechanism to encourage the participation of multiple stakeholders and to generate lasting development impacts. But as the case study of competitive research grants in Nepal illustrates, there is a lack of capacity, not only to effectively administer such grants but also to implement the projects through equitable sharing of risks, responsibilities and rewards among multiple stakeholders. To increase aid effectiveness, multi-lateral and bilateral donors can align their research funding strategy with that of national and local research priorities using a diversity of funding mechanisms, not just pushing the competitive funding mechanism as a pancea of increasing development impacts. Therefore, competitive funding should diversify funding mechanisms moving beyond the recent focus on incentive-based delegation, and facilitating delegation to networks to address purely user-inspired emergent priorities.

The network delegation in particular should focus on capacity development of self-organizing networks for greater self-provisioning of research and other innovation services. Such a diversification of competitive funding mechanisms can not only generate scientific breakthrough and develop promising technologies, but also facilitate innovation and entrepreneurship through increasing local and disadvantaged stakeholders' access to and control over the processes of knowledge creation, exchange, regulation and application. Further research on science and innovation policy would involve documenting the

processes of delegation to self-organizorganizing networks, and assessing context specific development impacts of such networks, regarding knowledge creation, technology design, innovation and small enterprise development.

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Notes

1. While drawing an analogy between funding agency and commercial banks, Braun identifies three main differences in terms of capital investment, returns on the investment, and investment decisions. While commercial banks have well defined aim of profit making, funding agencies struggle for, often conflicting, interests of multiple stakeholders creating dialectics of delegation of research and other innovation services.
2. As this paper focuses on various mechanisms of competitive fund allocation, to do justice to a discussion of diverse mechanisms of resource mobilization is beyond the scope of this paper. Readers are suggested to consult the literature as follows: joint venture (Sparling and Cook 2000), strategic alliance (Hamel and Prahalad 1989), endowment (Janssen 1998, Brinkerhoff 2000), levy and check-off (Janssen 1998, Brinkerhoff 2000, Klerkx and Leeuwis 2008a).
3. The US Government and the UK Government have been key bilateral donors in agricultural research and development along with multilateral donors, such as the World Bank, the United Nations Development Programme (UNDP), the Food and Agriculture Organization of the United Nations (FAO) and the Asian Development Bank.
4. Although these centres were initially established to rehabilitate retired British Gurkha into rural agriculture in their birthplaces, their domain of service includes hill agriculture and livestock in general.
5. The seven-point criteria includes a set of guidelines for reviewers as follows: (1) multi-disciplinary and participatory – 25%; (2) client-oriented – 20%; (3) consideration for outscaling and upscaling – 20%; (4) prioritizes poverty reduction – 10%; (5) addresses gender issues – 10%; (6) addresses environmental issues – 10%; and (7) realistic in terms of the time frame – 5% (see www.nardf.org.np).
6. Braben's (2002) innovativeness index to assess a project proposal involves a set of criteria against a three-point scale (0 = least innovative to 2 = most innovative), which characterize innovative research proposal as follows: (1) proposals having overarching priorities; (2) least structured; (3) conceptually challenging the mainstream thinking and less likely to find a genuine peer to conduct peer review; (4) difficult to define a success and involves a great deal of intellectual rigour; (5) research results could lead to development of new field of studies; (6) timescale is intermediate; (7) research is unique and has little or no competition; (8) research results are not clear at the outset and potential avenue to publish the results is also not clear; (9) research might win a prize; and (10) new collaborators may or may not be involved but the research is of interest to all existing and emergent collaborators.
7. Other regional networks that have been facilitated by the IDRC are the Latin American and Caribbean Environmental Economics Programme (LACEEP), the South Asian Network for Development and Environmental Economics (SANDEE) and the Centre for Economics and Policy in Africa (CEEPA).

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Appendix 1. Criteria of evaluating blue-ocean research proposals

Score: 30/30 purely entrepreneurial research

1. Research theme:
- Is within the purview of a national funding council, priority, or initiative. If so, score 1.
- Overlaps two national funding committees, priorities, or initiatives. If so, score 2.
- Extends over several national funding committees, priorities, or initiatives; or none are relevant. If so, score 3.

2. The objectives of the research:
- Are SMART – specific, measurable, attainable, realistic and time-bound. If so, score 1.
- Are general. If so, score 2.
- The researchers, who are often entrepreneurs or work in collaboration with entrepreneurs, are completely free to tackle emergent problems that they face at the local level. If so, score 3.

3. Assessment of a proposal by peer review:
- The reviewers are fellow experts. Their opinions are pertinent. If so, score 1.
- Involves several practitioners, not necessarily so-called experts, from different sectors. If so, score 2.
- Is problematic in principle, because the researchers are radically challenging conventional peer review process bringing untested ideas and methods in the project proposals. If so, score 3.

4. Funding requirements:
- Long-term funding is required to initiate local innovation and entrepreneurship. If so, score 1.
- Seed money would spark innovation and entrepreneurship. If so, score 2.
- Innovation and entrepreneurship is/are emergent irrespective of the availability of funding. Additional performance-based funding can help upscale the local innovation and develop small enterprises. If so, score 3.

5. Implications of the expected results:
- They most likely to demonstrate impacts within the project period. If so, score 1.
- They can lead to positive outcomes, such as changes in habits, practices and relationships at the local, regional and national levels, within the project period. If so, score 2.
- They can lead to positive outcomes, such as changes in habits, practices and relationships at the local, regional and national levels, within the project period. These outcomes can be intended as well as unintended through the self-organising processes of collaboration among two or more stakeholder groups. If so, score 3.

(*Continued*)

Appendix 1. (Continued)

Score: 30/30 purely entrepreneurial research

6. Timescale:
- The research is expected to meet its targets in the time allowed. If so, score 1.
- The ultimate goal is unlikely to be achieved in the time allowed for a project. If so, score 2.
- Some level of the expected results of the project has been already achieved. The research aims to build on existing initiatives and collaborations that are successful. If so, score 3.

7. Competitors:
- The competition is bloody, partly as a result of structural inequality, such as class, caste, gender, age and ethnicity. If so, score 1.
- There is no or little competition; the ideas presented in the proposal stand out. In-kind contribution is estimated at 50% or more of the funding being requested but these processes are primarily let by elite groups. If so, score 2.
- The competition is irrelevant. Structurally disadvantaged project stakeholders, including new scholars and entrepreneurs, have strategies in place to generate funds in case external funding is unavailable. If so, score 3.

8. Publication:
- The expected results will probably be published by a mainstream international journal. If so, score 1.
- The expected results might be published by national journals. If so, score 2.
- The expected results might initially be difficult to get published in academic journals. Possible non-conventional publication outlets can be policy briefs, discussion papers, and promotional videos and popular media to influence the public policy process and to spark innovation and entrepreneurship at the local level. If so, score 3.

9. Prizes:
- The researchers do not really expect to win a prize. If so, score 1.
- It is conceivable that the researchers might win an award from a learned society or professional association. If so, score 2.
- It is convincing that researchers might win additional grants enough and or attract additional resourceful partners to promote their ongoing work, which in turn would generate additional funds. The resources that new partners bring on board does not necessarily have to be financial. If so, score 3.

10. Stakeholder participation:
- The proposed research involves a new collaboration, but project stakeholders strive to coordinate each other because each collaborator has different, often self-serving, interests. If so, score 1.
- New collaboration may or may not be involved, but project stakeholders cooperate each other because the proposed research is a major interest for everyone involved. If so, score 2.
- New collaboration may or may not be involved, but project stakeholders collaborate through full sharing of resources, risks and accountability because the proposed research is an urgent need for everyone involved, including local political bodies, small entrepreneurs and faith communities. If so, score 3.

Source: Authors with reference to Braben (2002).