49th Annual Conference of the Australian Agricultural and Resource Economics Society,
Coffs Harbour, 9th – 11th February 2005

Funding and Managing Agricultural Research in a Developing Country: a Papua New Guinea case study

By

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Abstract

Agricultural R&D in many developing countries plays an important economic role. However, to sustain successful agricultural R&D requires adequate, reliable funding and sound management and governance. In many developing countries, generating reliable flows of R&D funds and ensuring their proper management are major challenges. This paper uses a case study in Papua New Guinea to illustrate these problems in agricultural R&D and outlines possible solutions. The main solution of fund diversification and commercial activity by the R&D provider, a practical success in the Papua New Guinea case study, could have wider applicability to other industries and other developing countries. The structural solutions provide more security of funding, lessen impacts of possible corruption and provide commercial incentives for R&D effort.

Keywords: *Developing country, R&D, agriculture, governance, corruption, case study*

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Introduction

Many studies report relatively high returns for investment in agricultural R&D in both developed and developing countries (Pardey and Craig, 1989; Persley, 1998; Alston et al., 2000; Maredia and Byerlee, 2000). Often in developing countries there is no shortage of possibly profitable investments in agricultural R&D. Bennett (1998) notes "There is a growing body of evidence of the returns that can be secured from investment in well-managed and well-targeted research." (p.ix).

However, deficiencies in the management, funding and practice of agricultural R&D in developing countries can limit the beneficial outcomes from R&D. Ruttan (1989) and Alston and Pardey (1996, 1998), for example, note how political self-interest and opportunism are major forces that shape the funding, structure and therefore outcome of agricultural R&D endeavour. Often in developing countries where the agricultural sector is a main source of employment and where the share of population in rural areas is large, the political economy of the funding and provision of agricultural R&D is particularly important. Eyzaguirre (1996, p. 5) comments that: "No national research manager in a small country needs to be reminded that his or her national research system operates in a climate in which the winds of political change can blow swiftly and, highly destructively."

Furthermore, developing countries are often reliant on overseas aid and the donors of these funds can influence substantially the agricultural R&D priorities in recipient countries (Alston et al., 1995). Hence, the strategic political self-interest of donor countries can play a major role in influencing the size and direction of agriculture R&D in developing countries (Ruttan, 1989).

Whilst the types of political influence over agricultural R&D funding, management and practice may differ in different developing countries, these influences are likely to be more important in countries particularly reliant on agriculture and where political instability is more manifest. In this paper Papua New Guinea (PNG) is used as an illustration of such a country and a case study of R&D on two of its major tree crops, cocoa and coconut, serves to exemplify the issues surrounding the funding, management and practice of R&D.

The paper is structured as follows: Section 2 reviews cocoa and coconut R&D funding in PNG and highlights the important impacts of political influence upon agricultural R&D. Section 3 presents some options for improving the funding, management and practice of agricultural R&D in response to issues such as political influence that affect R&D activity.

2. Cocoa and Coconut R&D funding in PNG

Papua New Guinea's agricultural research intensity ratio, defined as the ratio of research expenditures to either the gross value of agricultural products or agricultural GDP (Alston et al., 1999), is above several other developing countries (Pardey et al., 1999). Nonetheless, it has been long argued that agricultural research in Papua New Guinea (PNG) is under-funded (World Bank, 1981; ISNAR, 1982; Antony et al., 1988; Antony and Parton, 1991), particularly in the export tree crop sector where PNG has a comparative advantage (Jarrett and Anderson, 1989).

Until the 1980s, the financing of all agricultural R&D in PNG was the responsibility of the national government. Funds were allocated through the Agriculture Branch within the then Department of Primary Industries (now re-organised and renamed as the Department of Agriculture and Livestock). In the 1980s the national government re-structured its funding and organization of agricultural R&D. Semi-autonomous research institutes, such as the Cocoa and Coconut Research Institute (CCRI), were formed to conduct R&D on specific

commodities, with a greater share of their R&D funds coming directly from producers of those commodities.

These institutes received funds from the national government in the form of annual grants provided as part of the national budget process. R&D funds also came via variable industry research levies deducted from the prices paid to farmers when they sold their produce. This system of mandatory commodity levies, or checkoffs (Alston et al., 1999) is a funding mechanism used widely in many developed countries to support commodity-specific or near-market R&D. Additional funds were provided by overseas aid agencies, usually for specific research projects or programmes. These funding arrangements remain in place.

Table 1 displays the sources of R&D funds for the CCRI from 1995 to 2002. Large changes in the relative importance of funding sources are shown, particularly for funds generated by the CCRI and from overseas donors. From 1995 to 2002 external donor funding decreased from 52 per cent to 2 per cent whilst the CCRI contribution increased from 8 per cent to 64 per cent. Industry levy receipts and national government funds appear to be reliable sources of R&D support. However, the reality is somewhat different.

Table 1: Sources of funds for cocoa and coconut R&D in Papua New Guinea 1995 to 2002

	1995	1996	1997	1998	1999	2000	2001	2002	8-year average	Range
Commodity levies (mill. kina)	1.18	1.34	1.68	1.74	1.04	0.75	0.52	0.43	1.08	
% share	*21.6*	*24.5*	*29.4*	*25.4*	*13.3*	*9.9*	*6.8*	*4.7*	*15.6*	*24.70*
Public funding (mill. kina)	0.98	0.84	1.25	0.79	1.46	2.75	2.89	2.66	1.70	
% share	*18.0*	*15.4*	*21.8*	*11.6*	*18.7*	*36.6*	*38.0*	*28.9*	*24.5*	*26.40*
International funding (mill. kina)	2.87	2.31	2.21	1.70	1.01	0.56	0.52	0.21	1.42	
% share	*52.6*	*42.2*	*38.7*	*24.8*	*13.0*	*7.5*	*6.8*	*2.3*	*20.5*	*50.30*
Total CCI (mill. kina)	0.42	0.98	0.58	2.62	4.31	3.44	3.69	5.88	2.74	
% share	*7.8*	*17.9*	*10.1*	*38.2*	*55.1*	*45.9*	*48.4*	*64.0*	*39.4*	*56.20*
GRAND TOTAL (mill. kina)	**5.45**	**5.47**	**5.72**	**6.85**	**7.82**	**7.50**	**7.62**	**9.18**	**6.95**	

Source: Audited account reports, CCRI.

In PNG the Cocoa and Coconut Research Institute (CCRI) is the main recipient of R&D funds for cocoa and coconut R&D. There is little privately funded cocoa and coconut R&D. An exception was Kulili Estates, who own and manage several cocoa and coconut plantations on Karkar Island. They initiated the establishment of the Cocoa Black Pod Research Trust in Madang Province and partly funded some cocoa and coconut R&D. However, this has now ceased.

2.1 Commodity levies

The cocoa and coconut producers support CCRI research activities by a variable levy based on the marketable tonnage of each crop produced or exported. The levy from the cocoa industry is a fixed sum of K30 per tonne whilst that of copra was initially fixed at K2 per tonne but was increased to a fixed sum of K4 per tonne in 1997.

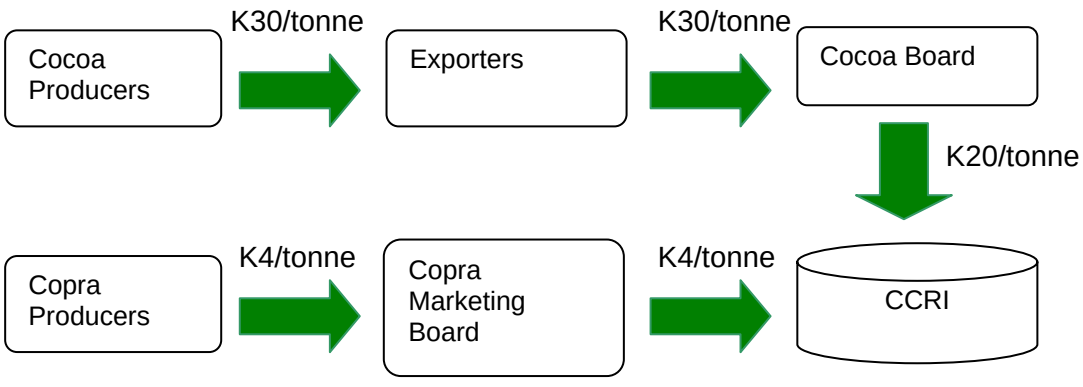
For copra, the Copra Marketing Board (Amendment) Act 1997 states that the R&D levy should be an amount 'not exceeding 2 per cent' of the per tonne producer price. Whilst this implies an *ad valorem* tax on the producer price, in practice the levy has been a flat rate of K4 per tonne. At 2003 prices, the 2 per cent upper limit equates to about K6 per tonne, making the current K4 per tonne levy equal to an *ad valorem* levy of 1.3 per cent.

The size of levy receipts depends not only on the levy rate but also on the annual marketable volume of each crop. When production is high, levy receipts are relatively higher and vice versa. Since the introduction of the levy, production of cocoa and copra has fluctuated markedly and hence levy receipts have varied greatly. The adoption of the flat rate levy, however, does mean that levy receipts are insensitive to market price changes in cocoa or copra.

Figure 1 illustrates the collection procedure for the cocoa and coconut research levies. Cocoa producers pay a K30 per tonne levy, of which two-thirds (K20) is passed on to CCRI as a research levy whilst the rest is maintained by the Cocoa Board for its operations. The system is such that research levies are automatically deducted from each producer's gross income at the exporter's warehouse. The exporters then transfer the funds to the Cocoa Board, who should then pass it on to CCRI. Likewise for the copra industry levy, the Copra Marketing Board used to collect it from producers at their buying depots and then transferred the funds to CCRI. The deregulation of copra marketing and the formation of the Kokonas Indastri Koporesen (KIK) effectively abolished the Copra Marketing Board. The KIK currently imposes an K8 per tonne copra levy and K12 per tonne coconut oil levy to cater for both research and extension after the merger of CCRI and the Cocoa and Coconut Extension Agency in 2003.

Figure 1

Procedures for Collecting Cocoa and Coconut Research Levies



Until 1998, commodity levies were disbursed without problems using the procedures described above in Figure 1. However, a trend developed during 1999 where disbursements of research levies became more lagged than usual. By February 2001, CCRI was still

chasing outstanding levies for 1999 and 2000 from the Cocoa Board and the Copra Marketing Board. This trend continued in 2001 and 2002 as shown in Table 1. Cocoa and copra producers continued to contribute commodity levies, but the funds were not transferred to CCRI as before. In August 2001, PNG's national newspaper, the *Post Courier*, raised the allegation that the funds were being redirected inappropriately for personal use by board members.

These delays in receipt of R&D funds then caused problems in managing research project portfolios and added to difficulties in planning and prioritising R&D activity. The funding uncertainties exacerbated problems of retaining and attracting R&D staff to work on cocoa and coconut. Such negative impacts of apparent corruption and politicisation are common-place in many developing countries (Wei, 1999) and are recognised as major impediments to growth and development (Mauro, 1995; World Bank 1997; Tanzi and Davoodi, 1997).

2.2 Direct National Government funding

The cocoa and coconut industries (Coulter, 1984; Turner, 1985) and PNG Rural Industries Council (Manning, 2000) have over the years proposed without success a 'kina for kina' (matching grant) contribution from the national government for agricultural research. The principle behind the matching grant was that, for every kina the industries contributed, the government should match it up to a certain ceiling. For example, in Australia, PNG's colonial neighbor and main overseas funding donor, the Rural Industries Research Act of 1985 established a research fund for any industry willing to impose a research levy on its producers, with a matching dollar by the national government to a limit of 0.5 per cent of the gross value of production in the respective industry (Alston et al., 1999). Uruguay has a similar funding mechanism (Echeverría et al., 1996).

However, the PNG national government has resisted any matching of contributions. Rather the national government's policy has been changeable. Electoral imperatives and self-interest have led to direct political influence in the funding of agricultural R&D. Fleming and Yala (2001) note how the national government of PNG is yet to devise an appropriate funding strategy for agricultural R&D.

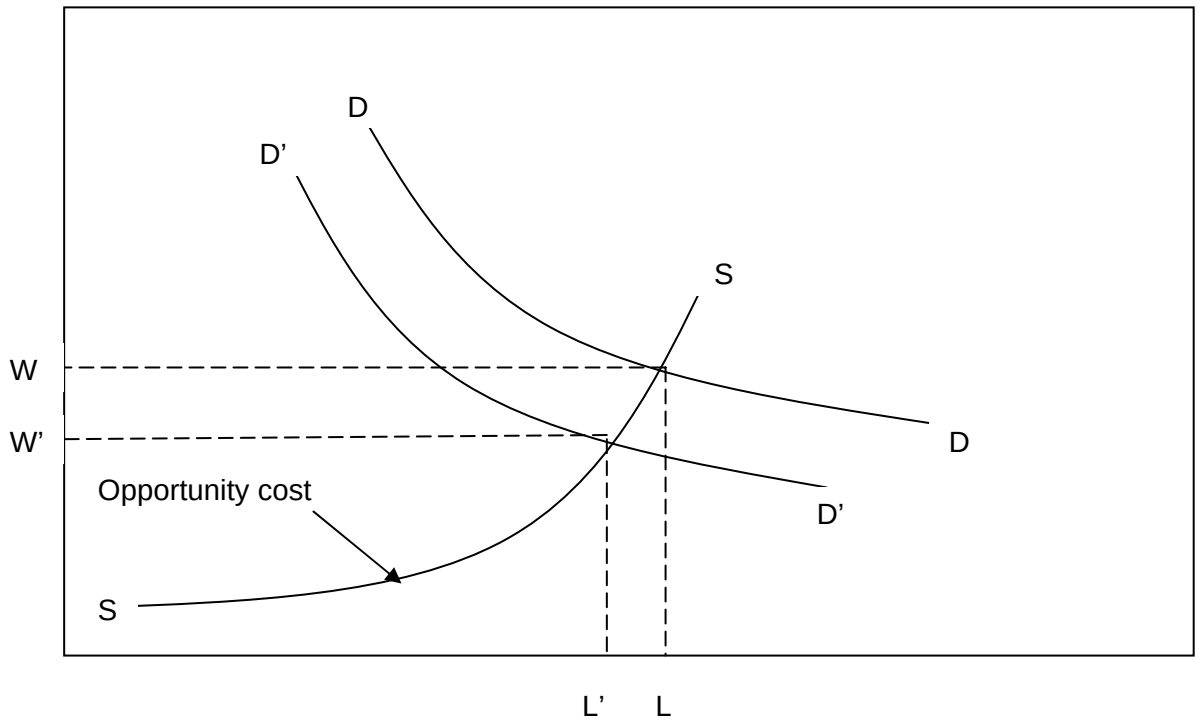
The following typifies the *ad hoc* and highly politicised response to agricultural R&D funding by the national government of PNG:

> In 1999 the national government led by Mr Bill Skate abolished recurrent government funding for most research institutions, including agricultural R&D organisations. This created apprehension and uncertainty in research organisations and for some, it placed their immediate and longer-term sustainability in doubt. Many research institutions experienced severe difficulties in funding staff salaries. However, a change of government in July 1999 rescinded this decision and provided funding for these organisations, including CCRI, in a supplementary budget. The incoming government announced that agriculture would be a priority area for funding (Igara, 2000).

Competitive remuneration and a stable research environment are two important factors in attracting and maintaining a pool of qualified and experienced researchers in an organisation. Accumulation of institutional capacity in the form of knowledge and expertise facilitates quick and appropriate responses to research problems when they arise (Wright and Zilberman, 1993). However, the reverse is also true: poor remuneration and uncertainty within the research environment can force researchers out of an organisation. This can be represented graphically as in Figure 2, when there is contraction of the demand for R&D services from DD to D'D'.

Figure 2

Employment impacts of reduced R&D funding



In response to the funding-induced contraction, staff with low opportunity costs tend to stay, even if it means a reduced salary, W to W'. By contrast staff with high opportunity costs leave for better or more secure employment elsewhere. In research institutes like CCRI often it is the staff with higher qualifications and some research experience that have the higher opportunity costs. These staff usually are more mobile with employment networks beyond their local research institute. Often these staff are among the more productive workers with attractive work records that facilitate their employment in other organisations. Loss of these workers weakens the research performance of institutes such as CCRI.

2.3 International donor funding

Various international organisations have invested in cocoa and coconut R&D in PNG since 1992. The Asian Development Bank (ADB) was the sole investor for cocoa and coconut R&D from 1992 to 1994. In 1995 the European Union (EU) through their STABEX grants, began investing in cocoa and coconut R&D. Since 1995 the EU has been a major investor in cocoa and coconut R&D in PNG. AusAID/Australian Centre for International Agricultural Research (ACIAR) have also become important contributors since 1998. Other minor donors in recent years include the Common Fund for Commodities, the International Cocoa Organisation and the International Plant Genetic Research Institute. These organisations have funded an international cocoa breeding project in which CCRI participates. The International Cooperation with Developing Countries has also funded a coconut beetle control project.

Funds from international donors, however, have been declining in both nominal and real terms since 1995 (see Table 1). The share of total CCRI funds that have come from international donors has shrunk from 53 per cent in 1995 to 2 per cent in 2002. Among the international donors, the EU has been by far the largest investor, contributing about K1.4 million per annum from 1995 to 2001. This equates to 88 per cent of the total international funding over the same period.

Alston et al (1995) observe that research institutes in developing countries commonly greatly depend on international donors. Accordingly these donors can greatly influence the research directions and priorities of the local research institute. Two problems emerge. The first is 'provider capture' where if the international donor is the major funder of the research institute, then the donor determines more of the activity of the institute than it directly pays for. The second problem is rent-seeking by those involved in the creation and administration of the projects funded by the international donors. Rent-seeking (Fleming, 1996) can lead to the misallocation of research resources, short-term opportunism and failure to deliver planned achievements.

Since the mid-1990s the CCRI has experienced a situation that has affected its ability to provide R&D services and to be attractive to researchers as a potential source of employment. The key ingredients of its difficulty have been the vagaries of its annual funding, political interference and apparent corruption.

Corruption is pervasive in PNG, especially in political circles, so much so that Time magazine carried a feature article on PNG titled "Cult of Korapsen" (Feizkhah, 2002). Kaufmann *et al* (2003) reported perceptions of corruption in 194 countries and found Papua New Guinea to be among a sub-group of worst offenders. Transparency International (2003) also report another corruption perceptions index for 133 countries, with Papua New Guinea being ranked the 13th worst.

In 2003, partly in response to corruption and mal-administration within PNG, the Australian Government made the granting of over $350 million of aid to PNG conditional on PNG agreeing to a range of measures that promoted good governance. Almost 20% of the Australian Government's foreign aid goes to PNG and around a fifth of all aid to PNG is for improving governance (Commonwealth of Australia, 2002). The aid from Australia aims to strengthen law and justice institutions, provide training in basic financial management to public servants, promote civil participation and representation, build public sector capacity to deliver essential services and finally, to support economic management and private sector investment in PNG.

In the face of these difficulties and changes affecting the provision of agricultural R&D services, what options are available to R&D managers and which of these options has CCRI adopted?

3. Options for sustainable agricultural R&D funding

Of the two options discussed below only the first has been systematically adopted by CCRI. This first option is the diversification of funding away from national government and international donor funding toward other more reliable sources. This is not to say that CCRI has sought less funds from the national government and international donors, but rather has intentionally boosted its funding from other more stable sources.

The second option is legislative change. The CCRI could combine with other R&D institutes and overseas aid donors to lobby for change in national legislation that would provide greater security of national funding for agricultural R&D.

3.1 Diversification of R&D revenue generating sources

Partly in response to uncertainty about the flow of funds from the national government and international donors, and the unfolding uncertainty over the speed of transfer of collected levies, the CCRI acquired three commercial cocoa and coconut plantations in late 1998. This investment has proved worthwhile by supporting CCRI's cash flow in 1999 when the recurrent public funding that accounted for about 14 per cent of the institute's annual budget was abolished by the national government. The CCRI's commercial plantation operations

and planting material units continue to provide financial support to the institute and encourage a commercial focus for its R&D.

Revenue from the plantations and planting material units of CCRI have increased significantly since 1998. In 2002, the relative share of funding from these sources accounted for 64 per cent of the institute's annual budget (Table 1). Funds generated by CCRI commercial operations have increased from 0.4 million kina in 1995 to over 5.8 million kina by 2002.

There are additional commercial opportunities, which CCRI has yet to fully develop such as the production and sale of publications or information, conducting cocoa and coconut management and training courses, providing contract consultancy services, and creating an exporting company to export its cocoa and copra directly. Such ventures are not without commercial risk. For example, the Copra Marketing Board that distributes funds to CCRI, established in 2000 its own cocoa exporting company to compete against established exporters. The venture was a commercial failure with the company being out of business barely a year later.

The commercial revenues of the CCRI have depended on the development of an efficient supply chain for cocoa and copra production as described by Bridges (1996). The purchase of additional plantations since 1998 has allowed unit costs of production to be lowered through economies of scale. Alliances have been established and maintained with reputable exporters. Production from its large-scale operation has ensured consistency in supply of cocoa and copra and planting materials. Improvements in field management have raised the quality of its output to standards preferred by exporters and manufacturers abroad. Communication along the supply chain, involving plantation managers, exporters, and the CCRI R&D staff has enhanced the profitability and reliability of plantation production.

A possible outcome of CCRI's increased reliance on self-funding is that its research output may take on more private good characteristics (price-excludable, rival in use). R&D innovations with these characteristics are more amenable to commercialisation. In effect, CCRI is encouraged to generate research products (e.g. planting material) either that farmers will need to pay for to access, or that only CCRI and other contracted plantations will have access to through closed loop marketing arrangements. Technologies with public good characteristics (non-price excludable and non-rival in use) represent a restricted opportunity for commercial gain by CCRI, and so such investments are likely to be less-preferred.

Whether the CCRI should largely be self-funding or whether its funding by government and international donors should increase is an interesting issue. Alston and Pardey (1999), for example, argue that agricultural R&D products may be a public good due to partial non-excludability and non-rivalry attributes, but this does not mean that all sectors of an economy will benefit, nor does it mean that everyone in the country should pay. Much of the revenue generated from cocoa and copra production is from exports. Further, as PNG is a minor player in international trade of cocoa and copra, price-offsetting effects of quantity- and quality-enhancing R&D will be small. Hence, producers are likely to be the main beneficiaries of cocoa and coconut R&D. Accordingly, evoking the 'beneficiaries should pay' principle means their R&D contributions as levy-payers and purchasers of research outputs should dominate (Alston and Mullen, 1992).

However, the government's financing of R&D and support for the tree crop sector in PNG has stemmed mostly from welfare concerns (Gumoi, 1993; Omuru, Fraser and Burton, 1997). A majority of small rural households in the country depend on these crops (coffee, cocoa, copra and oil palm) for their livelihood, and indirectly so do their surrounding communities, so supporting R&D for cocoa and coconut acts as a form of community welfare. The commitment by the national government in 2001 to subsidise coffee and copra producers

with K10 million and K5 million respectively, due to the depressed prices of cocoa and copra, illustrates the welfare agenda of the government. Accordingly, to improve the welfare of rural households engaged in cocoa and coconut production may be better achieved through public funding the provision of R&D outputs with public good characteristics.

Despite the common knowledge among politicians and bureaucrats that over 80 per cent of PNG's population dwells in rural areas, that most are engaged in agriculture as smallholder farmers and that many stand to benefit from investment on agricultural R&D, nonetheless the reality is that government funding of agricultural R&D is often inadequate and variable. Accordingly, although there is a strong case for greater government funding of R&D for crops such as cocoa and coconut, and a strong case for R&D outputs with public good characteristics, often research institutes are forced to look elsewhere for funding. To the extent that R&D institutes, such as CCRI, are forced to rely increasingly on self-financing then commercialization of their R&D outputs will be a growing priority.

3.2 Public agricultural R&D funding strategy

Fleming and Yala (2001) state that PNG's national government has no appropriate strategy or formula to fund agricultural R&D. For many years, agricultural R&D funding has been appropriated on an *ad hoc* basis. It has fluctuated and been intermittent. However, had there been enabling legislation for an appropriate strategy on how these funds were to be gathered and allocated, then greater accountability, consistency and predictability in R&D funding might have been possible.

As shown in the following sub-section, the reduction in national government funds reduces the ability of CCRI to reward its scientists, lessens their effort and lowers the probability of research success. Such an outcome is likely to be additive across the range of research institutes in PNG that suffer the vagaries of national government funding. To alter the *ad hoc* system of funding requires concerted and co-ordinated action by the PNG research community, supported by international donors, including foreign governments. Such a task is beyond the capability of the CCRI which is why the CCRI has pursued other means to secure its funding. Nonetheless, it is clear that CCRI would benefit from legislative change that improved the governance and reliability of national government funding.

Scientific Impacts of Reduced Government Funding

The ramifications of a reduction in government funding can be illustrated using a principal-agent model such as developed by Bardsley (1999) who in turn drew on Grossman and Hart (1983). Consider the case where CCRI as a principal offers a scientist (the agent) an incentive-based payment schedule. In practice, in 1998 the CCRI adopted a performance-based incentive scheme for its staff. All staff were appraised on the basis of their achievements with leading staff receiving 10 per cent bonuses or more rapid promotion (Omuru, 2003).

Consider the case where the agent (scientist) is risk averse, with a utility function separable in money and effort. The agent is paid to work on a project. If the project is successful then the principal (CCRI) pays the agent $X = x(U)$, which includes a bonus such that the total reward package yields monetary utility U. If the project is a failure then the principal pays the agent $x = x(u)$, yielding a monetary utility u.

On balance the project may succeed, with probability p, producing a benefit b to the principal. If the project fails then fewer benefits limited to c are generated. The agent will participate in the research provided their expected utility is non-negative and will apply effort $e(p)$ that ensures the project will succeed with probability p. However, as the agent is risk averse ($x'(u) > 0$ and $x''(u) > 0$), and assuming $e'(0) = 0$, $e'(p) \geq 0$, $e''(p) > 0$ and $e'(p) \rightarrow \infty$ as $p \rightarrow 1$, it follows that the agent (researcher) can increase the probability of project success by working harder but can never guarantee the success of the project.

So the principal's objective is to maximize:

$p(b - x(U)) - (1-p)(x(u) - c)$

subject to the participation and incentive compatibility constraints:

$pU + (1-p)u = e(p)$
$U - u = e'(p)$

Figure 3 shows the effort function $e(p)$, the reward structure (u, U) and the probability of success. The chord between u and U is tangential to the effort function, displaying adherence to the agent's participation and incentive compatibility constraints.

Figure 3

A researcher's effort function, reward structure and probability of research success

(Based on Bardsley, 1999)

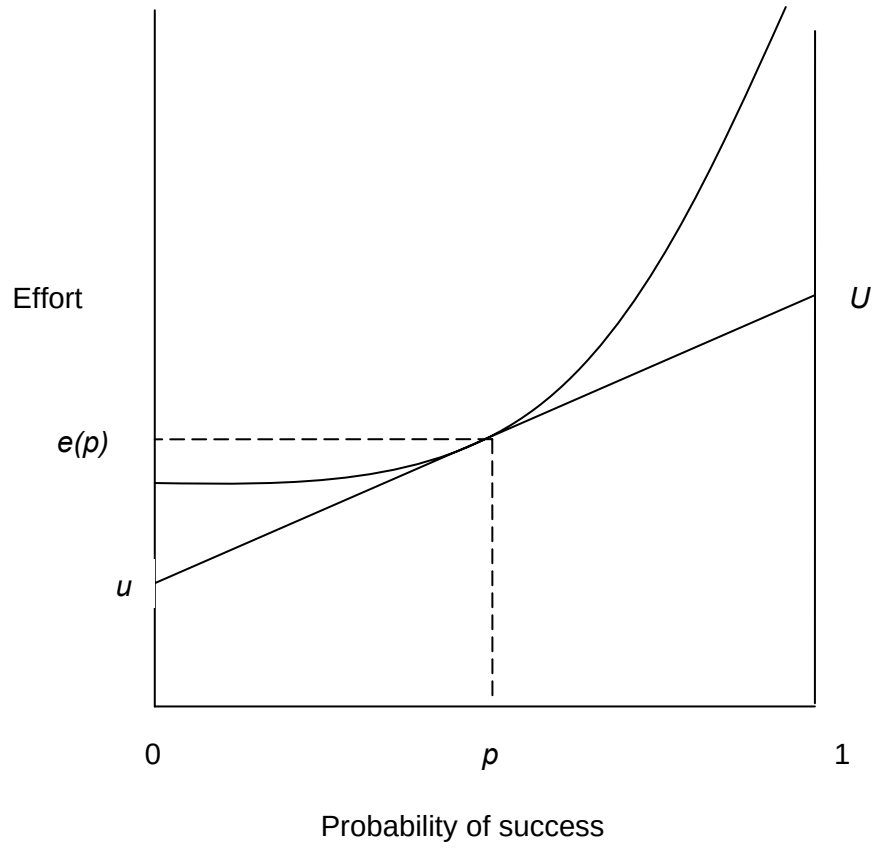
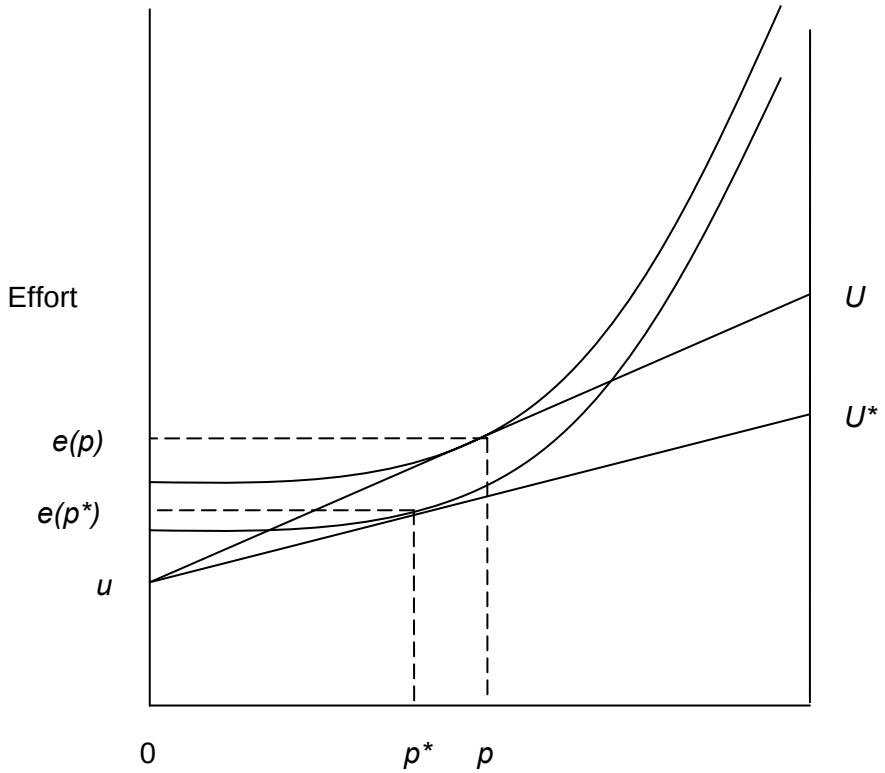


Figure 4 shows the ramifications of a reduced reward structure caused by less funding. It assumes there are sufficient funds for u but that bonuses for success are reduced to U^*. Various other combinations not shown are also possible where reduced funding lowers both u and U.

Figure 4

A researcher's effort function and probability of success when the reward structure is reduced



The ramifications of the reduced funding are that rewards to the agent (scientist) are less, their resultant effort is less and the probability of project success is lowered. Although CCRI implemented its performance-based incentive scheme for staff in 1998, and continued staff assessments each year up until 2002, the bonuses and promotions were only applied in 1999. Funding restrictions and turnover of senior staff, whose approval to pay out bonuses was required, have meant that staff have not received any performance-based remuneration since 1999. Effectively the CCRI staff has experienced a situation like that depicted in Figure 4 where bonuses tied to performance have reduced.

Conclusions

Politics plays a part in influencing allocative decisions for agricultural R&D resources (funds) in both developed and developing countries. In small developing countries where governments can be unstable and where good governance and sound institutional arrangements can be lacking (Roy and Tisdell, 1998), political influences and corruption in the allocation of R&D funding can be commonplace, thereby lessening growth prospects generated by sound research endeavour. This paper uses a Papua New Guinea (PNG) case study to illustrate these issues and shows how the management of an agricultural R&D institute responds to and is affected by these issues.

The political economy of R&D funding in PNG has affected its Cocoa and Coconut Research Institute (CCRI) by making its funding and practice of R&D subject to greater uncertainty and variability. There have been undue delays in receipt of funds, the likely misappropriation of funds and even the unexpected cessation of recurrent R&D funding by the national government. In response the CCRI has sought alternative funds and increasingly relies on funds it generates through its own commercial activities, principally plantation ownership.

This shift to self-financing reduces some of the impacts of the vagaries of national government funding and poor governance of growers' levy funds. However, it does mean that there is a likelihood of CCRI's research agenda being biased towards innovations with private good characteristics suited to commercialization. Whether such a shift in research effort occurs and whether or not PNG's predominately rural population is well-served by such developments are important issues.

This paper applies a principal-agent model to show that when R&D funds are reduced, as has been the case due to political and other influences, then reward structures for researchers can be altered leading to less effort by researchers and a reduced probability of research success. In a small developing country like PNG in which the agricultural sector plays an important social and economic role, welfare losses arising from the poor governance of agricultural R&D, ineffective institutions, corruption and inadequate reward structures can be large. There is often no shortage of research problems nor is there a lack of potentially worthwhile R&D investments. The moral dilemma for some managers of research institutes becomes a choice to either participate in politicization and corruption or to minimise their impacts while seeking a different, perhaps more enduring, basis for R&D activity.

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