ECONOMIC BENEFITS OF RESEARCH: MEASURING AND REPORTING

By

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Abstract

AT THE ISSCT Management Commission Workshop in Townsville, Australia in May 2008, it was reported that, to a larger or lesser degree in most sugarcane producing countries, a 'disconnect' exists between research centres and their stakeholders. One reason for such a 'disconnect' is that research centres in many industries have already largely maximised productivity potential through cane variety breeding programs but stakeholders are not convinced of this, resulting in incongruent expectations. Another possible reason for the 'disconnect' is because productivity improvements are blurred by varying agro-climatic conditions and management practices. It has been suggested that research centres should better employ economic benchmarks to enable sugarcane growers to easily rank different research outcomes that compete for limited on-farm capital and management time. For non-financial experts, capital budgeting can be intimidating but spreadsheets take care of the complex mathematics and an economist or financial expert can be employed to source and disseminate generic costs. The capital budgeting methods described and adapted in this paper for the R&D context provide a powerful marketing tool for R&D outcomes in terms of attracting research funding and enhancing technology transfer to larger sugarcane growing firms in particular. Sugarcane farming is a business and research centres are increasingly required to communicate in the 'language' of business, notwithstanding the other environmental and social aspects of sustainable triple bottom line reporting. In an increasingly competitive global environment, this shift towards an improved understanding of economics is appropriate to all scales of sugarcane agriculture.

Introduction

At the ISSCT Management Commission Workshop in Townsville, Australia in May 2008, it was reported that, to a larger or lesser degree in most sugarcane producing countries, a 'disconnect' exists between research centres and their stakeholders (Wynne *et al.*, 2008a). One reason for such a 'disconnect' is that research centres in many industries have already largely maximised productivity potential through cane variety breeding programs but stakeholders are not convinced of this, resulting in incongruent expectations. Breeding programs are indeed synonymous with maximising productivity potential and, although this rate of productivity increase has 'slowed' within commercial agriculture in recent times due to limitations associated with economic, environmental and management factors, active breeding programs must continue to ensure pests, disease, climate change, *etc* do not compromise productivity potential going forward and to create new economic opportunities through new products (e.g. energy cane) and farming systems (e.g. sustainably reducing input costs). This implies that relatively static productivity improvement benchmarks such as tonnes cane/sugar per hectare do not necessarily demonstrate that research and development (R&D) is ineffective; on the contrary, it may demonstrate its importance in preventing productivity declines.

Another possible reason for the ‘disconnect’ is because productivity improvements are blurred by varying agro-climatic conditions and management practices (Wynne *et al.*, 2008b). Technology transfer plays an important role in facilitating the effective adoption of appropriate management practices for different agro-climatic conditions. Therefore, one of the technology transfer challenges is to convince industry participants of the economic value that will be derived from the implementation of a research outcome. Wynne *et al.* (2008a) suggest that research centres should better employ economic benchmarks to enable industry participants to easily rank different research outcomes that compete for limited on-farm capital and management time. This use of ‘business language’ should also aid research centres to compete more aggressively for investment funding for their future research programs; traditional physical benchmarks such as tonnes cane/sugar per hectare are less effective. The objective of this paper is to assist in providing this language; a glossary of the main economic terms used is presented at the end of the paper. While recognising the importance of environmental and social aspects of sustainable triple bottom line reporting (Christiansen, 2004), this paper will only explore the third economic component.

Economic benchmarks for end users of R&D outcomes

The underlying objective function of any sugarcane grower is to make a sustainable and preferably competitive economic return on their limited land, capital and management time. Increasing tonnes cane per hectare or sucrose percent cane are ‘derivatives’ of this underlying economic objective function. Therefore, ranking independent and/or mutually exclusive R&D outcomes in terms of economic worth, subject to environmental and social safeguards, should facilitate decision making and enhance technology transfer.

Governments typically evaluate large public sector projects in terms of the public's willingness to pay for them (benefits) or willingness to avoid them (costs), expressed in the form of a cost-benefit ratio. This is effectively achieved by listing all parties affected by an intervention where a monetary value or ‘welfare’ effect is assigned to each party. This welfare approach is not suited to the business environment of a sugarcane grower; capital budgeting techniques employed by business are more appropriate because they are aligned to optimising economic returns to limited land, capital and management time and therefore technically more robust. Capital budgeting techniques are well documented in the literature, where Brigham and Ehrhardt (2005) is the primary source in this paper. These capital budgeting techniques are explored with the view of applying or adapting them as economic benchmarks for R&D outcomes.

Determining relevant cash flows

Capital budgeting decisions are based on ‘free’ cash flows for the entire business, which is the cash flow generated by an economic activity that is available for distribution to investors. An accepted definition of incremental free cash flow for a specific business entity is as follows:

Incremental free cash flow = EBIT[1] (1-Tax) + Depreciation – Gross fixed asset expenditure – Change in net operating working capital

If an R&D outcome were to fully replace an existing on-farm operation, the cash flow difference between the existing and the new constitute the incremental free cash flow of this decision. Consequently, only the incremental cash flows pertinent to the R&D outcome are relevant; all other cash flows associated with other business activities cancel each other out. However, externalities associated with the adoption of an R&D outcome must be included in the

[1] EBIT means earnings before interest and tax but inclusive of depreciation and amortisation.

incremental free cash flow calculation, whereby the earnings or cost structure of an existing operation might be enhanced or reduced; *i.e.* the net financial effect of the R&D outcome. Similarly, 'opportunity costs' must also be included as incremental free cash flows. This could be the market related cash flow that could be generated from an existing asset if it were made redundant by the adoption of the R&D outcome in question or the incremental free cash flows foregone if an existing asset becomes underutilised. The 'opportunity cost' approach is also a helpful tool in quantifying the value of costs and benefits that are difficult to otherwise express in financial terms.

Different businesses have different mixes of debt and equity capital (financial gearing) that have different tax implications, attracting different tax rates and possibly different tax laws that may require specialist skills. Furthermore, different businesses have different exposures to financial gearing or amortisation costs as well as working capital requirements. In instances where the implementation of an R&D outcome does not constitute a significant change to the existing financial status of a business, it can be assumed that tax implications and working capital requirements remain largely unaffected. It can also be assumed that 100% equity capital is used to finance fixed asset expenditure associated with the R&D outcome; *i.e.* amortisation costs are zero[2]. Consequently, the incremental free cash flow definition can be modified to cater for benchmarking R&D outcomes as follows:

Incremental free cash flow = EBITDA[3] for R&D outcome – Fixed asset expenditure for the R&D outcome – Opportunity cost of underutilised assets

The challenges that remain are associated with qualifying fixed asset expenditure that will be incurred by a grower implementing the R&D outcome. A 'sunk cost' is fixed asset expenditure that has already been incurred and hence is not an incremental free cash flow and should therefore be excluded from the analysis. Conversely, the market value of an asset after its useful life, or 'salvage value', must be included. In terms of the incremental free cash flow timing, it is usually assumed that these occur at the end of each planning period (months or years). Where specialist accounting or economic skills are scarce, as in the scientific realms of research centres, this simplified and standardised approach to determining 'generic' incremental free cash flows has merit. Thereafter, adaptations can be made by industry participants or their agents to reflect 'specific' business entity operating environments.

Determining relevant discount rates (finance costs)

Incremental free cash flows arising from the implementation of an R&D outcome will accrue over a period of time into the future and because a dollar in hand today is worth more than a dollar received in future due to the interest it can earn. Future values (FV), therefore, need to be discounted to a present value (PV), which can easily be computed using a financial calculator or spreadsheet with the following underlying equation, where 'r' is the annual discount rate and 'n' the time period in years:

$$\mathrm{PV} = \frac{\mathrm{FV}}{(1+r)^{\mathrm{n}}}$$

Inflation complicates matters because inflation erodes FVs; *i.e.* FVs are understated if 'today's' values are used as a proxy for FVs. Therefore, in the presence of inflation, FVs must either be adjusted by an inflation factor or the annual discount rate (r) must be adjusted by an

[2] In practice, most growers will utilise some debt financing but the extent is widely variable. The standardised 100% equity funding approach is both simple and reflective of the full value of the R&D outcome.

[3] EBITDA means earnings before interest, tax, depreciation and amortisation; *i.e.* income generated by the R&D outcome less operating costs incurred by the R&D outcome, excluding depreciation and amortisation associated with the R&D outcome.

inflation factor. The latter approach is appropriate if it is assumed that a similar and consistent inflation factor will apply to all FVs and, because it is simple and robust, it is the preferred approach for research centres.

A business's weighted average cost of capital (WACC) is the preferred annual discount rate but this varies between businesses and, therefore, from a generic benchmarking perspective, it is proposed that the national prime lending rate[4] be used as the grower's proxy annual discount rate (which is termed the nominal annual discount rate r_n; *i.e.* before inflation is accounted for). A producer related inflation factor (i) is then used to adjust the nominal annual discount rate (r_n) to a real annual discount rate (r_r) as illustrated below, whereby FVs are expressed in 'today's' nominal values (*i.e.* FV_n before inflation is accounted for) :

$$PV = \frac{FV_n}{(1+r_r)^n} \quad \text{where } (1+r_r) = \frac{(1+r_n)}{(1+i)}$$

Discounted Payback Period (DPP)

The simplest capital budgeting method is the 'Discounted Payback Period', defined as the expected number of years required by the grower to recover the initial capital investment, which is expressed as follows and illustrated in

Table:

$$\text{Discounted payback period} = \text{year before full recovery} + \frac{\text{Unrecovered discounted cost in that year}}{\text{Discounted cash flow in subsequent year}}$$

Table 1—Discounted payback period example.

Annual Real Discount Rate (r_r) =	5%				
Period (years) =	0	1	2	3	4
Undiscounted Nominal Cash Flow =	-$1,000.00	$500.00	$500.00	$300.00	$300.00
Discounted NCF =	-$1,000.00	$476.19	$453.51	$259.15	$246.81
Cumulative Cash Flow =	-$1,000.00	-$523.81	-$70.29	$188.86	$435.67
Year before full recovery =	2				
Unrecovered cost in above year =	$70.29				
Cash flow during subsequent year =	$259.15				
Pay back period =	2.27				

R&D outcomes with shorter payback periods are preferred. This easy to understand 'breakeven' benchmark is also indicative of the R&D outcome's liquidity, providing a helpful perspective of associated risk. Its downfall, however, is that no cognisance is given to neither cash flows received after the payback period nor the economic life of the R&D outcome.

Net Present Value (NPV)

The 'Net Present Value' method takes cognisance of all cash flows, which is expressed as follows and illustrated in Table 1 (assumes the R&D outcome has an economic life of four years).

[4] Benchmarking research centres across international borders is complicated by exchange rate differentials. However, exchange rates, among other drivers, are influenced by nominal national prime lending rates. Therefore, if the use of nominal national prime lending rates becomes standard international practice for research centres, the international benchmarking of research centres becomes more meaningful.

$$NPV = CF_0 + \frac{CF_1}{(1+r_r)^1} + \frac{CF_2}{(1+r_r)^2} + \dots\dots\dots + \frac{CF_n}{(1+r_r)^n} \;//\; NPV = \sum_{t=0}^{n} \frac{CF_t}{(1+r_r)^t}$$

Table 1—Net present value example.

Annual Real Discount Rate (r_r) =	5%				
Period (years) =	0	1	2	3	4
Undiscounted Nominal Cash Flow =	-$1,000.00	$500.00	$500.00	$300.00	$300.00
NPV Period 1 =	$476.19 ◄				
NPV Period 2 =	$453.51 ◄				
NPV Period 3 =	$259.15 ◄				
NPV Period 4 =	$246.81 ◄				
Total NPV (incl initial outlay) =	$435.67				

Effectively, a NPV of zero means that the associated cash flows of the R&D outcome are sufficient to repay the initial capital investment over the expected life to the project. A positive NPV means the grower receives an economic return; *i.e.* wealth is created. NPV is arguably the best measure of absolute wealth creation but is unhelpful when R&D outcomes with varying capital investment requirements and unequal lives need to be compared and/or comparisons made to the opportunity cost of capital such as interest rates and/or competing off-farm investments.

Profitability Index (PI)

The 'Profitability Index' facilitates the comparison of R&D outcomes with varying capital investment requirements because it calculates the present value per dollar of initial cost, which is expressed as follows and illustrated in Table 2.

$$PI = \frac{\text{PV of future cash flows}}{\text{Initial cost}} = \frac{\sum_{t=0}^{n} \frac{CF_t}{(1+r_r)^t}}{CF_0}$$

Table 2—Profitability Index example.

Annual Real Discount Rate (r_r) =	5%				
Period (years) =	0	1	2	3	4
Undiscounted Nominal Cash Flow =	-$1,000.00	$500.00	$500.00	$300.00	$300.00
NPV Period 1 =	$476.19 ◄				
NPV Period 2 =	$453.51 ◄				
NPV Period 3 =	$259.15 ◄				
NPV Period 4 =	$246.81 ◄				
Total NPV (excl initial outlay) =	$1,435.67				
Profitability Index =	1.44				

A 'breakeven' R&D outcome will have a PI of 1 and the higher the PI, the more attractive the R&D outcome becomes.

Using the PI approach to compare R&D outcomes with unequal lives or with the opportunity cost of capital, however, remains problematic.

Internal Rate of Return (IRR)

The 'Internal Rate of Return' is defined as the discount rate that equates the present value of the R&D outcomes future cash flows and the initial capital investment.

The IRR is the discount rate where the NPV is zero, which is expressed as follows and illustrated inTable 3.

$$\text{PV (investment costs)} = \text{PV (cash flows) OR} \quad \text{NPV} = 0 = \sum_{t=0}^{n} \frac{CF_t}{(1+IRR)^t}$$

Table 3—Internal Rate of Return example.

Annual Real Discount Rate (r_r) =	?				
Period (years) =	0	1	2	3	4
Undiscounted Nominal Cash Flow =	-$1,000.00	$500.00	$500.00	$300.00	$300.00
NPV Period 1 =					
NPV Period 2 =					
NPV Period 3 =					
NPV Period 4 =					
Total NPV (incl initial outlay) =	$0.00				
Internal Rate of Return =	24.8%				

If the IRR is greater than the grower's debt interest rate, the grower is creating wealth and the adoption of the R&D outcome is considered beneficial. In theory, the IRR method solves the problems of comparing R&D outcomes with unequal lives and with the opportunity cost of capital. Unfortunately, the IRR method incorrectly assumes that all cash flows can be reinvested at the IRR rate, which means that projects with varying cash flows cannot be objectively compared; which includes R&D outcomes of unequal lives and/or with varying opportunity cost of capital.

Modified Internal Rate of Return (MIRR)

The 'Modified Internal Rate of Return' addresses the shortcomings of the IRR method by calculating the terminal value of each of the future cash flows using a known real discount rate and then solving for the discount rate that equates the present value of the combined terminal values with the initial capital investment. This definition is expressed as follows and illustrated in Table 4.

$$\text{PV (investment costs)} = \text{PV (terminal cash flow value) OR} \quad \text{NPV} = 0 = \frac{\sum_{t=0}^{n} CF_t \; (1+r_r)^{n-t}}{(1+MIRR)^t}$$

Table 4—Modified Internal Rate of Return example.

Annual Real Discount Rate (r_r) =	5%				
Period (years) =	0	1	2	3	4
Undiscounted Nominal Cash Flow =	-$1,000.00	$500.00	$500.00	$300.00	$300.00
Terminal Value Period 4 =				@ $(1+r_r)$	$300.00
Terminal Value Period 3 =			@ $(1+r_r)$		$315.00
Terminal Value Period 2 =		@ $(1+r_r)$			$551.25
Terminal Value Period 1 =					$578.81
Total NPV (incl initial outlay) =	$0.00				$1,745.06
Internal Rate of Return =	14.9%				

There are several alternative definitions of MIRR; the differences primarily relate to how positive and negative cash flows are compounded. Most spreadsheets have a MIRR function that accommodates all options but, as most growers are indebted, it can be safely assumed that reinvestment is at the cost of capital or real national prime lending rate (r_r); *i.e.* positive and negative cash flows are compounded using the same discount rate. This avoids unnecessary financial complexity in the R&D context. Essentially, the MIRR method provides a standardised measure to compare different R&D outcomes of unequal economic lives as well as alternative investment options; *i.e.* if the MIRR is greater than the real national prime lending rate (r_r), the R&D outcome creates more wealth than a risk free investment at the bank. What the MIRR does not achieve is provide an indication of the total value add of the potential R&D outcome.

Recommended capital budgeting approach for R&D outcomes

Given that spreadsheets take care of the complex mathematics associated with capital budgeting with relative ease and that no single approach provides a panacea, it is recommended that three capital budgeting approaches be routinely computed for each R&D outcome and communicated with industry participants in the context of the unique insights each approach provides as described in Table 5. Other capital budgeting techniques can be ignored for reasons already given and/or because the insights they provide are already provided by those mentioned in Table 5.

Table 5—Recommended capital budgeting approach for R&D outcomes.

Method	Motivation
Discounted Payback Period	Provides a measure of the R&D outcomes initial liquidity and associated risk profile.
Net Present Value (economic life)	Provides a measure of absolute wealth creation, which needs to be contextualised with the economic life.
Modified Internal Rate of Return	Provides a standardised measure enabling different R&D outcomes with different economic lives and cash flows to be compared as well as alternative investment options.

In a study of 392 Chief Financial Officers employed by non-agricultural firms (Graham and Harvey, 2001), 74.9% and 75.7% evaluated new projects using the Net Present Value and Internal Rate of Return respectively, with 56.7% using the payback approach; *i.e.* most firms use more than one evaluation approach. This survey also found that smaller firms were more likely to rely on the payback approach, while larger firms were more likely to rely on the Net Present Value and Internal Rate of Return, which is consistent with earlier studies by Brierman (1993) and Walker *et al.* (1993). The three most cited reasons why smaller firms focus on the payback approach are:

(1) smaller firms preoccupation with liquidity, which is best indicated by payback;

(2) a lack of familiarity with capital budgeting techniques; and

(3) a belief that small projects do not warrant the effort of a capital budget.

Large sugarcane growing firms, such as those found in South and Central America, may already use capital budgeting techniques to evaluate new projects. Such practices are expected to be less common in Australia and South Africa where cane growing firms are much smaller and absent altogether from industries that are populated by very small firms like India and Thailand. From a research centre perspective, the use of capital budgeting as an extension and marketing tool is expected to have the highest uptake and to be most effective among larger firms. This does not negate the use of capital budgeting at research centres that service smaller firms because capital budgeting provides:

(1) an invaluable tool for the internal evaluation of projects; and

(2) improves stakeholders' understanding of economic terms and business sense.

Research centres, therefore, need to tailor their initial capital budgeting approach to their immediate circumstances. Striving for economic perfection at the outset will be a misguided approach. Instituting an economic focus or 'culture' is as much about change management as it is about economics.

Economic benchmarks for research centres generating R&D outcomes

Researchers generally have limited exposure to economics and therefore may be reticent to employ economic benchmarks, particularly if this approach is burdensome. Ensuring 'buy-in' from researchers may require the compilation of generic costing sheets that are updated and disseminated for researchers to use in their own R&D outcome capital budgets. Training would also need to be provided to maintain robust and reliable results.

The most meaningful incentive to employ economic benchmarks, however, is for researchers to demonstrate the value of their research, particularly to attract funding resources. This is also true for the research centre as a whole, creating an incentive for the research centre to consolidate all its independent capital budgeting models. This has the advantage of facilitating a measure of standardisation and providing a 'checking step' for all the capital budgets for independent R&D outcomes. These composite measures for the research centre are expressed as follows (superscripts RC and RO stand for research centre and research outcome respectively):

$$\text{Weighted average DPP}^{RC} = \frac{\sum_{i=0}^{n} \text{DPP}_i^{RO} \, . \, \text{NPV}_i^{RO}}{\sum_{i=1}^{n} \text{NPV}_i^{RO}}$$

$$\text{Weighted average MIRR}^{RC} = \frac{\sum_{i=0}^{n} \text{MIRR}_i^{RO} \, . \, \text{NPV}_i^{RO}}{\sum_{i=1}^{n} \text{NPV}_i^{RO}}$$

A research centre cannot sum the NPV of each research outcome to determine its absolute wealth creation because there are often numerous parallel research outcomes that would result in double counting. The annual budget of the research centre provides an indication of the scale of the research centre and its associated operations. In terms of a research centre's attention to liquidity, risk and return on investment, the weighted average DPP^{RC} and the weighted average MIRR^{RC} provide a clear enough picture.

Implementation

Cost estimates are the basis of capital budgeting and therefore need to be reliable. Research centres that embrace capital budgeting therefore must also implement measures to collate cost estimates. There are numerous ways this can be done, which include

(1) subsidising a book keeping service for farmers from which costs can be extracted;

(2) forging relationships with farmers and their accountants to share costs on a confidential basis;

(3) conduct statistically sound economic surveys; and

(4) establish costs from a zero base by contacting market participants directly.

With the advent of computers and increasing uptake of computerised accounting, all of these approaches are becoming more robust. In practice, a combination of approaches is usually required, the emphasis being determined by local conditions.

An *ex-ante* evaluation should be conducted prior to or at the start of a project to aid in project planning, but these often suffer from a dearth of information and potential biases in data and analyses, examples of which include:

(1) reliance on past projects that may differ markedly in function, size and certainty in the skill levels of the researchers;

(2) reliance on crude heuristics ('rules of thumb') to estimate free cash flows, particularly of intangible elements; and

(3) an inability to dispel biases (often unconscious) of researchers who often have a vested interest in a 'go ahead' outcome or a 'think positive' psychological tendency.

Ex-post evaluations of R&D outcomes, therefore, are equally important; *i.e.* economic evaluations after implementation to test assumptions and accuracy.

An example best illustrates how the economic benchmarks described can be employed by a research centre: A research centre breeds and develops cane variety A followed by cane variety B.

When variety B is released, sugarcane growers need to decide whether to continue with variety A or replant with variety B, where the yields are 100 and 90 tonnes cane per hectare respectively and ratooning ability of 3 and 4 years respectively, as illustrated in Table 6.

At first glance, a grower might be tempted to retain variety A because of its higher annual undiscounted nominal cash flow and shorter discounted payback period arising from its higher yield.

However, once the ratooning cycles have been accommodated, variety B shows greater economic promise with a higher net present value and modified internal rate of return.

The grower might nevertheless retain variety A for environmental reasons such as susceptibility to pests and diseases (although the researcher could discount the yield to accommodate this impact in conjunction with probability scenarios) or social reasons whereby a contractor that undertakes both harvesting and planting for the grower threatens to withdraw completely if the planting schedule is altered.

The composite measures for the research centre's breeding program are also presented.

Table 6—Illustrative example of a sugarcane grower selecting a cane variety.

Assumptions			
Annual real discount rate (%)			5.0%
Cane price (per tonne of cane)			$25.00
Planting cost (per hectare)			$1700.00
Ratoon cost (per hectare)			$900.00
Harvesting costs (per tonne of cane)			$6.00
	Variety A	**Variety B**	**RC**
Variables			
Number of ratoons (economic life)	3.00	4.00	
Annual harvest yield (tonnes cane per hectare)	100.00	90.00	
Annual undiscounted nominal cash flow	$1000.00	$810.00	
Results			
Discounted Payback Period (DPP)	1.82	2.28	2.06
Net Present Value (NPV)	$1023.25	$1172.22	
Modified Internal Rate of Return (MIRK)	18.1%	19.7%	19.0%

Discussion and conclusion

For non-financial experts, capital budgeting can be intimidating. However, given that spreadsheets take care of the complex mathematics and an economist or financial expert can be employed to source and disseminate generic costs, the skill of constructing a capital budget can be developed on a broad scale within a research centre, particularly if economics becomes engrained in the organisation's culture. Such a culture should be the end goal of research centres but this can only be achieved incrementally over a period of time; striving for economic perfection is an unrealistic goal. However, researchers must be urged to identify and qualitatively explain their capital budgeting results because the results of capital budgeting are only as good as their assumptions and inputs.

Every effort must be made to ensure that data inputs have integrity. In this regard, it is recommended that updated generic costing sheets are regularly disseminated to researchers to input into their own capital budgets, that random capital budgeting audits are conducted and that training is provided to maintain robust and reliable results on a consistent basis.

The capital budgeting methods described and adapted in this paper for the R&D context provide a powerful marketing tool for R&D outcomes in terms of attracting research funding and enhancing technology transfer to larger sugarcane growing firms in particular.

Sugarcane farming is a business and research centres are increasingly required to communicate in the 'language' of business, not withstanding the other environmental and social aspects of sustainable triple bottom line reporting.

In an increasingly competitive global environment, this shift towards an improved understanding of economics is appropriate to all scales of sugarcane agriculture.

ECONOMIC GLOSSARY

Amortisation—a loan repaid in fixed equal periodic amounts that comprise principal and interest components.

Cash flow—all the cash transactions relating to a firm that occur during a defined period.

Discounting—the process of finding the present value of a single payment or series of payments.

Equity capital—financial contribution by the owners of a firm as opposed to debt finance.

Externalities—an indirect consequence of a project, where prices do not reflect the full costs or benefits in production or consumption of a product or service.

Liquidity—refers to a firm's cash position and its ability to make maturing payments. A liquid asset can be sold quickly and converted to cash.

National prime lending rate—the average interest rate payable to banks for debt finance on a project of average risk.

Nominal—the effects of inflation are not accounted for.

Opportunity cost—a cash flow that a firm must forego to accept a project, or alternatively the next best cash flow that a firm will accrue in the absence of a project.

Producer related inflation—the loss of purchasing power over time calculated using a basket of goods representative of producers' inputs. Consumer related inflation is associated with a basket of goods representative of consumers' purchases.

Real— the effects of inflation are accounted for.

Terminal value—at the end of a project, assets may have a terminal or residual value that can be realised.

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GAIN ECONOMIQUE DE LA RECHERCHE: MESURE ET RAPPORT

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MOTS CLÉS: Budgets Capitaux, Rentabilité, Retours sur Investissements, Transfert de Technologie, Financement.

Resume

A L'ATELIER de Gestion de l'ISSCT tenu en mai 2008 à Townsville, Australie, il fut rapporté que dans plus ou moins tous les pays producteurs de canne à sucre, une incompréhension existait entre les centres de recherches et les producteurs. Une des raisons de cette incompréhension est que la recherche avait déjà optimisé la productivité à travers les programmes de croisement variétal tandis que les producteurs n'étaient pas convaincus de cela et s'attendaient à de meilleurs résultats. Une autre raison de cette incompréhension, est le fait que les conditions agro climatiques et les pratiques culturales masquent souvent le gain de productivité. Il a été suggéré que les centres de recherches fassent des études économiques pour permettre aux producteurs de cannes de comparer les différents projets de recherche qui sont en compétition. Pour les experts non financiers, les budgets capitaux peuvent être décourageants, mais les chiffres peuvent être expliqués et un économiste ou un expert financier peut être employé pour identifier et ventiler les coûts des projets. Les méthodes de Budgets Capitaux décrits et adaptés dans cette présentation dans le contexte de R & D nous donne un puissant outil de marketing pour attirer des fonds pour la Recherche et accélérer le transfert de technologie au gros producteur de cannes en particulier. L'exportation de canne à sucre est un business, et les centres de recherches doivent aujourd'hui communiquer dans des termes financiers, sans oublier les autres aspects sociaux et environnementaux. Avec une augmentation de compétitivité dans l'environnement global, ce changement vers une amélioration de la rentabilité est approprié à tous les niveaux de la culture de la canne.

BENEFICIOS ECONÓMICOS DE LA INVESTIGACIÓN: MIDIENDO Y REPORTANDO

Por
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PALABRAS CLAVE: Presupuestos de Capital, Economía, Retornos, Transferencia de Tecnología, Financiamiento.

Resumen

EN EL TALLER de la Comisión de Gerencia de ISSCT que se llevó a cabo en Townsville, Australia en mayo de 2008, se reportó que en mayor o menor grado en la mayoría de países productores de caña de azúcar existe una ‘desconexión’ entre los centros de investigación y sus actores principales. Una de las razones para esta ‘desconexión’ es que los centros de investigación en varias industrias han maximizado el potencial de productividad a través de los programas de mejoramiento de variedades, pero los actores principales no están convencidos de esto, resultando en incongruencias en sus expectativas. Otra posible razón para la ‘desconexión’ es que las mejoras en productividad son opacadas por varias condiciones agro-climáticas y por algunas prácticas gerenciales. Se ha sugerido que los centros de investigación mejor deberían emplear comparativos económicos para permitir que los productores de caña puedan calificar los distintos productos de la investigación que compiten por el limitado capital y el tiempo gerencial del productor. Para los no-expertos en finanzas, el presupuesto de capital puede ser intimidante pero las hojas electrónicas se encargan de la matemática compleja y un experto en finanzas o en economía puede contratarse para direccionar o diseminar los costos genéricos. Los métodos de presupuesto de capitales descritos y adaptados en este trabajo para el contexto de I+D proveen una herramienta poderosa para el mercadeo de los productos de I+D, en términos de atraer financiamiento para investigación y el mejoramiento de la transferencia de tecnología particularmente para industrias azucareras más grandes y en crecimiento. La producción de caña de azúcar es un negocio y cada vez se requiere más que los centros de investigación se comuniquen en el ‘lenguaje’ de los negocios, sin dejar de lado los otros aspectos de los reportes de sostenibilidad o sea los ambientales y sociales. En un ambiente global en el que crece la competitividad, este giro que procura entender mejor la economía es apropiado en todas las escalas de la agricultura de la caña.