Planning Balance Sheet

☆ **Planning Balance Sheet** (PBS) developed by Nathaniel Lichfield to overcome some of the weaknesses of conventional cost-benefit analysis (CBA)

☆ CBA fails to assess wide range of benefits and costs which typically occur in regional or community planning or development situations

☆ Usually a wide range of effects over a number of **community groups**

☆ CBA conventionally limited to costs and benefits which can be expressed in **monetary terms**

☆ CBA seldom addresses the **equity** questions of **gainers and losers** in development projects or strategies

☆ PBS adaptation of CBA and retains principles of CBA

☆ PBS involves **identification of all relevant community groups** which are likely to be **affected by**, and/or **involved in**, the plan or scheme in question

☆ Involvement may be direct or indirect

☆ PBS addresses the question: **which groups are gainers and which groups are losers from the project or strategy?**

☆ That is, which groups benefit from the scheme and which groups pay for the scheme?

☆ In all projects, plans or strategies, **equity considerations** exist

☆ For virtually every change, some groups are gainers and some losers

☆ Most types of evaluation ignore these questions

☆ PBS specifically addresses these issues

☆ PBS produces a set of **social accounts** which are intended to include all impacts (including economic, social, environmental, hazard, etc) affecting each group

☆ CBA is directed towards the evaluation from point of **society as a whole**

☆ PBS directed towards evaluation from point of view of **groups in the community**

☆ PBS attempts to include **all relevant items** (costs and benefits) **whether or not they can be expressed in monetary terms**

☆ Some element of subjectivity therefore important part of PBS evaluation

☆ Conventionally PBS identifies the major groups in the community as either **producers** or **consumers**

☆ **Producers are those directly concerned with or involved in the project**

☆ **Consumers are those who are affected indirectly by the project or strategy**

☆ PBS illustrated by reference to an actual planning balance sheet

☆ PBS below prepared for considering costs and benefits of two alternative development strategies

☆ These are industry development or tourism development for an Australian community

☆ Producers and consumers listed in column (1)

☆ Their interests in outcomes listed in column (2)

☆ E.g. local government would need to supply infrastructure to the level of $14m if industrial development takes place

☆ But only to extent of $12.5m for tourism development

☆ Local government would receive rate income of $12m and $13.5m respectively from these options

☆ Some costs and benefits are included as (discounted in this case) dollar values

☆ Some are expressed as 'm' values

☆ 'm' values are intangibles, or those unable to be expressed in dollar terms with any degree of confidence

☆ Magnitude of 'm' values expressed over a range of '0' for insignificant to ++ for very significant

☆ PBS therefore provides a listing of all effects, whether in dollar terms or simply subjectively determined

☆ Tourism development option has the highest B/C ratio from the point of view of the producers as a whole (in terms of purely monetary benefits and costs)

☆ But industry development group has the highest B/C ratio for the consumer group

☆ Overall tourism development project has best B/C ratio in conventional CBA sense

☆ If take intangibles into consideration, ranking's could well change

☆ Can see extent to which each group is affected by the two strategies

☆ Therefore get some idea of who are winners and losers from each strategy

☆ E.g. clear that will be a benefit to new businesses from both strategies

☆ Those on fixed incomes who are renting homes will however be disadvantaged by increased rents

☆ Increasing rents result under both strategies

☆ PBS studies seldom formally undertaken in Australia

☆ However, philosophy of PBS is an important and attractive one for all those concerned with regional and community development

☆ If development to generally advantage the community, necessary to identify those expected to benefit and those expected to lose under proposed development strategy (even if in a general and subjective sense)

Balance Sheet of Costs and Benefits, Alternative Development Strategies

Group	Item	Costs		Benefits	
		Industry Develop-ment	Tourism Develop-ment	Industry Develop-ment	Tourism Develop-ment
(1)	(2)	(3)	(4)	(5)	(6)
A PRODUCERS/OPERATORS					
1 Local government	Infrastructure provision rate income	14.0	12.5	12.0	13.5
2 State government	Infrastructure provision - State taxes	20.5	12.5	9.5	6.0
3 Commonwealth government	Infrastructure provision - Commonwealth taxes	2.5	15.0	3.0	8.0
4 Local businesses	Benefits lost				
4.1 Businesses displaced	Disruption	1.0	1.0		
4.2 Businesses not displaced	Loss of trade	0.5	m+		
4.3 New businesses	New trade	m0		6.0	15.0
	Agglomeration economies				m+
5 Businesses outside area	Loss of business	m+	m++	m0	
	Group A	38.5	41.0	30.5	42.5
	Benefit-cost ratio	0.79	1.04		
B. CONSUMERS					
6 Existing residents					
6.1 Residents displaced	Disruption, lost benefits	0.4	0.6		
6.2 Residents not displaced	Loss of social contact	m++	m++		
	Improved facilities				
6.3 Fixed income renters	Higher cost of housing, etc	m+	m++	m+	m+
6.4 Home owners	Increased housing values, rates	0.2	0.4	0.8	0.9
7 Future residents	Changed environment	m+			m++
8 Tourists	Changed environment	m+			m++
9 Population at large	Changed environment	m+	m+		m++
	Group B	0.6	1.0	0.8	0.9
	Benefit-cost ratio	1.3	0.9		
	Overall total	39.1	42.0	31.3	43.4
	Overall benefit-cost ratio	0.8			

Notes: Intangibles shown by the letter 'm'; ++, +, 0 expresses magnitude. 0 is an insignificant amount, through to ++ indicating very significant

☆ Notes based on:

Module 18, *More Project Evaluation Techniques*

(R. C. Jensen and P. N. Smith)

Community Economic Analysis,

R. C. Jensen and G. West

Queensland Government

Department of Primary Industries,

2002, pp. 18-1 – 18-11

Goals Achievement Matrix

☆ Goals achievement matrix (GAM) is a method of evaluating alternative strategies or projects developed by Morris Hill*

☆ GAM relies on the specification of community goals or objectives and indicating extent to which strategies or projects achieve these goals

☆ GAM essentially addressing question: 'given that we can specify community goals or objectives, which development strategy or project is strongest on achieving these goals?'

☆ Technique basically follows three steps

☆ **Step (1)** - establishment and ordering of goals

☆ Goals should be defined operationally as objectives

☆ GAM approach defines both benefits and costs in terms of these goals

☆ Movement towards a goal defined as a **benefit**

☆ Divergence from a goal as a **cost**

☆ Definition of benefits and costs in GAM therefore different from that in cost-benefit analysis (unless one of the goals specified growth in gross regional product)

☆ Technique therefore benefit-driven in terms of stated goals or objectives

☆ Actual project or strategy costs (or incidence of these costs) not considered in GAM

☆ **Step (2)** - different groups within the community which are affected by projects or development strategies under consideration

☆ Inevitable that different groups will be affected in different ways and to different extents

☆ **Step (3)** - weighting of goals to express preferences of the community and the valuation of these objectives

☆ Simple GAM shown in Tables below

☆ Prepared on an ordinal scale (providing a ranking rather than absolute values of benefit)

☆ Progress towards a goal represented as +1

☆ No effect is recorded as 0

☆ A decrease in goal achievement is scored as -1

Simple Goals Achievement Matrix (GAM) - Ordinal Scale

	Employment (Community weight = 2)			Environment (Community weight = 1)		
	Weight	Plan 1	Plan 2	Weight	Plan 1	Plan 2
Group A	3	+1	-1	3	-1	0
Group B	1	-1	+1	2	0	-1
Total						

Simple Goals Achievement Matrix (GAM) - Ordinal Scale

	Employment (Community weight = 2)			Environment (Community weight = 1)		
	Weight	Plan 1	Plan 2	Weight	Plan 1	Plan 2
Group A	3	+6 (3 x 2 x 1) = 6	-6 (3 x 2 x -1) = -6	3	-3 (3 x 1 x -1) = -3	0 (3 x 1 x 0) = 0
Group B	1	-2 (1 x 2 x -1) = -2	+2 (3 x 2 x 1) = 2	2	0 (1 x 1 x 0) = 0	-2 (1 x 1 x -1) = 6
Total		4	-4		-3	-2

☆ Table expresses two goals - **increased employment** and **environmental issues**

☆ Expressed community weights of 2:1

☆ Two community groups (A and B) are defined

☆ Their different goals expressed as weights

☆ Represent extent to which groups adopt community goals (Group A 3,3 and Group B 1,2)

☆ From these ordinal scales, two strategies - Plan 1 and Plan 2 evaluated

☆ Plan 1 judged as preferable on GAM basis

☆ **Group A** perceives **Plan 1** to have an **employment benefit** (3 x 2 x 1 = 6) and **environmental cost** (3 x 1 x -1 = -3)

☆ **Group A** perceives **Plan 2** to have an **employment cost** (3 x 2 x -1 = -6) with no **environmental effect** (3 x 1 x 0 = 0)

☆ **Group B** perceives **Plan 1** to have an **employment cost** (1 x 2 x -1 = -2) with no **environmental effect** (1 x 1 x 0 = -2)

☆ **Group B** perceives **Plan 2** to have an **employment benefit** (1 x 2 x 2 = 2) and an **environmental cost** (2 x 1 x -1 = -2)

☆ Weighted index of goals achievement (From Table)

Plan 1 = 4 - 3 = 1

Plan 2 = -4 - 2 = -6

☆ Therefore Plan 1 is preferable to Plan 2

☆ GAM expressed as

$$V(A_i) = \sum_{g=1}^{G} \sum_{j=1}^{J} \alpha^g \beta_j \varphi_{ij}^g$$

$$\varphi_{ij}^g = \begin{cases} -1, & \text{progress away from a goal} \\ 0, & \text{no effect} \\ +1, & \text{progress towards a goal} \end{cases}$$

α^g = weight for group g

β_j = weight for goal j

$V(A_i)$ = score for plan i

☆ Note:

- **Plan 1** generates **employment** at some **environmental** cost

- **Plan 2** could lose **employment**, but provide **environmental** gains

- **Group A** has an equal (3,3) degree of adoption for **employment** and **environmental** goals

- **Group B** has higher degree of adoption (2,1) of **environmental** goals over **employment** goals

Two points need to be made

- more detailed GAM approach would have actual cardinal or absolute values of benefits and costs instead of the +1, 0, -1 valuation system (these values could be discounted for time)

- weighting system obviously crucial in the evaluation of alternatives (formation of weights should result from community research and interaction)

☆ In practice, difficult to avoid some degree of arbitrary or subjective judgement in weighting process

☆ GAM not been widely used in a formal sense in Australia at this stage

☆ Does however establish very important principle of establishing community and sectional goals and attempting to on the basis of these goals

☆ Rather than evaluating alternative strategies or projects on the goals of some other level of government

☆ These principles more often observed in an informal sense in community evaluations of projects or strategies

☆ GAM technique simply formalises the process to some extent

*Hill, M. (1966), A Goals Achievement Matrix in Evaluating Alternative Plans, *Journal of American Institute of Planners*, Vol.34, pp. 19-29

*Hill, M. (1973), *Planning for Multiple Objectives: An Approach to the Evaluation of Transportation Plans*, Regional Science Research Institute Monograph Series No.5

*Lichfield. N., Kettle, P., and Whitbread, M. (1975), *Evaluation in the Planning Process*, Pergamon
(Chapter 5 compares Lichfield's Planning Balance Sheet (PBS) with Hill's Goals Achievement Matrix (GAM))

*McAllister, D. M. (1980), *Evaluation in Environmental Planning*, M.I.T. Press
(Chapter 9 considers Lichfield's Planning Balance Sheet (PBS) and Hill's Goals Achievement Matrix (GAM))

☆ Notes based on:

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Cost-Effectiveness Analysis

☆ Definition of cost-effectiveness (CE) analysis varies somewhat according to context in which it is used

☆ Also according to the professional group applying the technique

☆ Probably most widely-applied application would be to answer the question - **which approach gives the highest payoff (benefits) per dollar invested in the project?**

☆ Approach applied to identify most cost-effective project from a number of projects

☆ Or to identify most cost-effective version of a particular project

☆ Broadly two types of applications:

☆ **(1) Variable Cost, Variable Benefit**

☆ E.g. given number of projects (or versions of the same project) with differing cost levels and differing benefit levels, need to identify most cost-effective project

☆ Situation represented in table below, where four projects are gives as A, B, C and D

Project	**A**	**B**	**C**	**D**
Variable Cost, Variable Benefit				
1. Project Benefit Level	354.8	360.1	550.6	230.8
2. Project Cost Level ($m)	153.2	164.6	560.8	88.7
3. Cost-effectiveness Ratio[(a)]	2.32	2.19	0.98	2.60

Note: (a) Cost effectiveness ratio will be equal to the benefit/cost ratio in some circumstances

☆ **Cost-effectiveness ratios** given in Row 3

☆ Shows that version C (although largest project) is not the most cost-effective

☆ Version C not considered to be cost-effective since CE ratio < 1.0

☆ Smallest project (version D) actually most cost-effective

☆ (2) **Variable Cost, Given Benefit**

☆ Table below shows rather simpler situation where four projects with the same benefit level, but with different cost levels

Project	A	B	C	D
Variable Cost, Given Benefit				
1. Project Benefit Level ($m)	354.8	354.8	354.8	354.8
2. Project Cost Level ($m)	153.2	155.5	148.6	166.9
3. Cost-effectiveness ratio[(a)]	2.32	2.28	2.39	2.13

Note: (a) Cost effectiveness ratio will be equal to the benefit/cost ratio in some circumstances

☆ CE analysis aims to identify the lowest-cost means of achieving a given level of benefit

☆ Here, choice is clearly project C

☆ While result of these calculations seems obvious, point to be remembered is that these calculations seldom undertaken

☆ i.e. most evaluations consider **only one version of a project** and ignore the fact that the same level of output could possibly be achieved by some rearrangement of the project to a lower-cost structure

☆ Cost-effectiveness analysis clearly more relevant in a **limited-budget situation**

☆ Also where emphasis is on getting the **highest return for the limited investment dollar**, rather than maximising total benefit to the community

☆ Notes based on:

Module 18, *More Project Evaluation Techniques*

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Threshold Analysis

☆ **Threshold analysis** (TA)* has been used mainly in a town-planning context

☆ However has some potentially useful aspects for regional development

☆ Essentially extension of cost effectiveness analysis

☆ Addresses additionally following question

> *'are there significant cost thresholds associated with different regional development strategies, and are these thresholds significant enough to affect the cost effectiveness of the strategies?'*

☆ **Threshold** essentially a level of activity which for some reason is critical

☆ Threshold needs to be identified as pivotal in an operational sense

☆ One definition of a threshold - level of population or expenditure which would support a business or industry in a region

☆ This threshold must be reached or maintained if the business or industry is to exist in the region

☆ TA in a regional planning context normally refers to a **limitation which is encountered as a town or region grows**

☆ Thresholds can be due to

- limited availability of land
- limited capacity of public infrastructure e.g. roads, transport
- limited supply of other resources such as skills and management

☆ Thresholds can be overcome but usually only by high capital investment (**threshold costs**)

☆ Threshold costs usually **lumpy**

☆ When threshold reached (say the upper limit of capacity of local airport, sea port or physical environment), required capital investment made in large lumps (rather than in continuous small flows)

☆ TA aims at identifying and estimating threshold costs associated with each alternative regional or local development strategy

☆ Ensures that threshold costs considered when evaluating these options

☆ E.g. a regional development strategy based on resort tourism could involve threshold costs associated with road development, airport development, etc,

☆ E.g. a strategy based on eco-tourism could involve threshold costs associated with environmental protection structures

☆ TA maybe used in evaluating different regional development strategies to ensure that all relevant costs are taken into account in cost-effectiveness or cost-benefit studies

☆ Could be useful in identifying points in time when thresholds are approaching

☆ Could be useful in considering changes in the direction of regional development

☆ TA has a potentially important role to play in the scheduling of public investment in infrastructure

*Kozlowski, J. (1986), *Threshold Approach in Urban, Regional and Environmental Planning: Theory & Practice* University of Queensland Press

*University of Edinburgh, Department of Urban Design and Regional Planning, Planning Research Unit (1973), *Threshold Analysis Manual* (Prepared for the Scottish Development Department), H.M. Stationery Office, Edinburgh

☆ Notes based on:

Module 18, *More Project Evaluation Techniques*
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