

Designing and Analysing Surveys Under Severe Resource Constraints

Stephen Haslett
Professor
Statistics Research and Consultancy Centre (SRCC)
Massey University,
Palmerston North
New Zealand.

s.j.haslett@massey.ac.nz

ABSTRACT

Often when surveys are designed and undertaken, particularly in third world countries, there are major resource constraints on time and finances. The time constraints can be linked to costs, but can also be in the form of requirements for rapid information. Sometimes the question is whether a survey is justified at all, given costs and the pressure to apply all available resources to the underlying problem. Even in this situation however, there usually remains a need for proper monitoring to measure progress. In the third world, adequate monitoring is also connected to a need to secure further funding, and this can alter the resourcing balance. These issues will be discussed with reference to surveys in Thailand, Uganda, Azerbaijan, Vietnam, Philippines, Bangladesh and Nepal, undertaken by a variety of national and international agencies.

Keywords: Sampling, small area estimation, resources, monitoring, poverty.

Background

Designing and analysing sample surveys under major resource constraints, even within a monitoring context, needs to be considered as part of a more general topic. In this broader framework, monitoring can have both quantitative and qualitative aspects. Any debate about whether qualitative or quantitative is better requires a context. In practical situations, decisions about what kind

of study to implement depend on what is already known about the issue being investigated. Resource constraints also have a major part to play. Quantitative studies such as sample surveys, are not necessarily better, even for what is essentially a well-defined measurement problem, if the resources required exceed those available. Without additional monitoring resources being available, the problem being monitored may have to be redefined. A qualitative study is often better, at least as the initial part of a study, if the question of what should be measured has not yet been adequately explored, even if funding for a quantitative study is available. In general, qualitative studies need to precede quantitative ones: detailed measurements even if accurate which are not related to the real purpose of the monitoring or research are of little use, just as qualitative evaluation is not adequate on its own where graduated responses or evaluation are required. This paper does not address these general issues further. Its focus instead is on quantitative studies and in particular on research studies involving design and analysis of sample surveys, where resources are severely limited but a statistically based study is required.

While severe resource constraints provide additional complications, no survey is designed without cost constraints. The question of limiting cost in sample survey design is a very broad one with a long history. For example, Hanson, Hurwitz and Madow (1953) discuss maximising accuracy for a fixed cost, which reflects the fact that no matter how well resourced a sample survey is, there are upper limits on cost. Cost functions are consequently an inherent part of the design of large scale nationwide sample surveys internationally, whatever country the survey is

being undertaken in. For example, the use of stratification and clustering in household surveys, and stratification in business surveys, with sample allocation to strata based on maximising accuracy for a given cost is almost universal. A detailed general discussion of costs in surveys can be found in Groves (1989).

This paper focuses on resource constraints for sample surveys where such constraints are particularly strong if not severe, but in doing so links to a more general resourcing framework which still applies where resource constraints are not so extreme.

The general discussion is linked to concrete examples from international statistical projects. These projects involve design and (descriptive) analysis of national sample surveys in Uganda, Vietnam, Thailand, and Azerbaijan; reference is also made to projects involving analysis and modeling of survey and census data for small area estimation of poverty in Bangladesh, the Philippines and Nepal.

For the Uganda, Vietnam and Azerbaijan projects, design and analysis of small scale national surveys were required to very limited time frame. In Uganda, the project was for the Global Entrepreneurship Monitoring Programme (GEM). The survey included necessity entrepreneurship undertaken by people otherwise without employment, not simply large scale enterprises. In Vietnam and Azerbaijan, the surveys were assessments of water and sanitation providers for the World Bank. The Thailand project involved a review of the existing Thai National Statistics Office (NSO) Business Establishment Survey for NSO and the World Bank. The analysis-based projects in Bangladesh, the Philippines and Nepal use existing national survey and census data for small area estimation of poverty (for the World Food Programme and the Bangladesh Bureau of Statistics in Bangladesh, for the Philippines National Statistics Co-ordination Board and the World Bank in the Philippines, and for the Nepal Central Statistics Office and the World Food Programme in the Nepal).

Monitoring requirements and constraints – a framework

Any general scheme for resource constraints for monitoring includes the requirements and constraints outlined in Table 1.

Table 1: General Monitoring Framework - Requirements and Constraints

Support:	data access official sanction
Funding:	in total and for monitoring
Time:	total duration / timeline
Personnel:	availability level of experience requirement for training
Expertise:	technical
Equipment:	hardware software
Communication:	mechanisms and language

As it applies to sample surveys, the first item, support, is linked to context. Surveys can require particular data for design, or government sanction in the country in which they are being held. Detailed, externally funded analysis projects require adequate data access and in some cases ability to negotiate the usual government data confidentiality restrictions on unit record data.

The second item, funding, is central. Monitoring, whether via sample surveys or not, is almost invariably linked directly or indirectly to a substantive project or policy issue, and often the total funding must be divided between the project itself and its monitoring. This is perhaps less the case internationally with major national surveys run by central government statistical agencies, since in this situation policy (or project) and monitoring have only an indirect connection and are often undertaken by different government agencies; indeed, government statistical agencies are best operated in an environment which is deliberately isolated from social or financial policy to maintain objectivity. Taken overall, the basis for the funding of surveys, even if they are not designated explicitly for policy purposes, is that the surveys inform policy; hence the terms ‘evidence based policy’ and ‘evidence informed policy’ currently in vogue. When the link between project and monitoring is more explicit, some hard allocation decisions are necessary. There is an inherent tension in that monitoring removes funds that could be spent on the project, but without adequate

monitoring the success or otherwise of the project is difficult to assess and this may have consequences for future funding. This latter issue can be particularly pertinent for third world projects, and will be discussed further in a later section.

Time has two main aspects. Often projects and their monitoring have deadlines, which require timelines for phases and project planning. Duration, which is separate from total time spent, is also important. Where projects are carefully planned and information can be gathered over a longer period or duration, even without additional time being spent, monitoring is likely to be better structured. Careful thought is important and given adequate preparation time, careful planning can often cut cost without deleteriously affecting outcomes.

Design, implementation, and analysis of surveys require a wide range of personnel: including survey statisticians, computing staff, field staff, project managers, and clerical staff. Many of these people require specialist training and experience and if even one function is not adequately filled survey implementation and quality suffer. Often training is required even if staff are experienced, for example for field operations for a new survey, and the amount of training necessary to ensure quality depends on the level of experience.

Training can be particularly important if the expertise required becomes highly technical. Survey design is often not a simple or even an elaborate clerical task, decisions during implementation can have unforeseen consequences, and where survey (and/or census) data require more detailed analysis, such as for small area estimation, this is a task which even professional level non-survey statisticians often need further training to undertake adequately.

Specialised survey software for sample design is not in general use, but is required for analysis of complex surveys (for example: Stata, Sudaan, WesVar) if lengthy, expensive, highly specialised and often error-prone purpose-built programs are to be avoided. Hardware must also be adequate for the amount of data that needs to be analysed, especially if the analyses needed are not straightforward. In detailed analysis projects, tens and sometime hundreds of gigabytes of data are involved, so that CPU and disk storage needs are often at the fringe or beyond what

even modern personal computers can handle, and careful planning and/or sectioning of the analysis is required.

Finally, communication is critical, whether for example it is between field work staff and local fieldwork headquarters, or between survey designers and operations staff. Computers, via email, file transfer, direct data input at interview are all useful technical aids but, at the personal level, discussion and co-operation can be even more important, as can establishing an agreed common language.

Monitoring requirements under major constraints – examples

When applied to real world examples, the framework outlined in Table 1 requires some extension, especially for projects where one or more resources are particularly constrained. The constraints may occur at one or many levels and it is useful to consider some concrete examples from particular projects in the third world, since in such circumstances constraints can be extreme. These examples cover a range of projects and problems but the list is non-exhaustive. It does however provide sufficient range that it is possible to use these examples to discuss general issues.

The projects considered in detail involve either design and descriptive analysis of national sample surveys undertaken in Uganda, Vietnam, Azerbaijan and Thailand, or more comprehensive analysis of survey and census data in Bangladesh, the Philippines and Nepal. Essentially there are three types of project:

- Design of a small scale national sample survey over a short period:
 - Uganda - Global Entrepreneurship Monitor (GEM): necessity entrepreneurship
 - Vietnam - World Bank: pilot study of water and sanitation providers
 - Azerbaijan - World Bank: pilot study of water and sanitation providers
- Diagnosing / auditing existing large scale national surveys:
 - Thailand - World Bank / Thai National Statistics Office: CDP-SP Project: Thai Business Establishment Survey
- Analysing existing survey and census data to produce small area estimates of poverty
 - Bangladesh - World Food Programme / Bangladesh Bureau of Statistics:

income and expenditure
related poverty

kilocalorie consumption

stunting and underweight in
children

Philippines - World Bank / National
Statistics Co-ordination Board:

income and expenditure
related poverty

Nepal: - World Food Programme /
Central Bureau of Statistics:

expenditure
food expenditure related
poverty

kilocalorie consumption

stunting and underweight in
children

Uganda

The Global Entrepreneurship Monitor (GEM) began in 1997 as a joint research program run by the London Business School (UK) and Babson College (USA). It aims to measure whether the level of entrepreneurial activity varies between countries and over time. Especially in the third world, almost all such activity includes 'necessity entrepreneurship' where people run small businesses (for example small roadside fruit and vegetable stalls) because there is insufficient formal employment. GEM has links with the UN Business Council. In 2003 there were 31 counties surveyed. Due to some internal complications, the project in Uganda (Walter et al. 2003) required a national survey to be designed and in the field within two weeks. Sound local survey design expertise could not be sourced at the time the project was being planned and this was the major constraint, despite timeline and funding also being major issues. In this study the substantive subject matter (entrepreneurship) and the survey to measure it were not part of a joint funding pool; design expertise was required from overseas, but even with this expertise the timeline necessitated using considerable local information (including substantial national administrative structure and detailed maps) that only became available once the Uganda Bureau of Statistics (UBOS) was approached officially; the field work manual needed to be written and the fieldwork team trained along with the design; the case for using specialised software needed to be made and the analysis done 'off-shore'; and communication was complicated by the need to assemble the survey team quickly beginning with a small local core and to administer the survey in Uganda's 42 different living languages. For details on Uganda's languages see, for

example, Ethnologue (2005) and in a more general context Harkness et al (2003).

Vietnam and Azerbaijan

The projects in Vietnam and Azerbaijan were linked. Both involved design, implementation and analysis of a survey of water and sanitation providers for the World Bank as a pilot project for preparation of a World Bank 'water and sanitation toolkit' which is to outline (with examples) how such surveys can be carried out for a range of countries. As for Uganda, the project established a monitoring technique but funding was not linked with the substantive topic (providing water and sanitation on a sound economic basis). The timeline for design in each country was again brief (a matter of weeks); personnel consisted of range of overseas World Bank consultants and people from a local survey firm in each country (so that the training component was able to be less general than in Uganda); equipment and most software was available locally, but survey budget required sample sizes to be relatively small (certainly too small to aim generally for anything more than preliminary national figures for water providers). As for Uganda, there was no complete list frame available, and the survey had to be based on sampling of administrative districts (communes in Vietnam, rayons in Azerbaijan) and enumerating suppliers within these, supplemented in Vietnam by a short list of more major providers. The tight timelines raised issues that could not be accurately answered at design stage about how many suppliers of each sort were expected on average per commune in Vietnam or administrative unit in Azerbaijan, which made sample sizes (in terms of number of suppliers but not clusters sampled) rather uncertain. Especially for Vietnam, this uncertainty would have been more easily controlled if the duration (even if not the total time available) were longer.

The studies in Vietnam, Azerbaijan and Uganda consequently raise a resourcing issue it is difficult to resolve. Overseas consultants are expensive so their involvement must be limited, which too easily leads to timelines that can become too short. However, spreading their time in-country over a longer period is difficult because travel and accommodation costs then rise, especially if several trips from home country are required rather than one, or even if the 'down-time' between periods of direct involvement requires accommodation costs in country to be met for the longer duration. A partial solution lies in very careful

planning before survey implementation. For example, given adequate preparation time, the internet allows judicious and rapid, cost-effective discussion between colleagues before the external consultants need to be in-country, and this is particularly effective where it has been possible to network (especially before the project) to make personal contacts and establish and document the required permissions.

Thailand

While this project again involved a sample survey, it was different to those in Uganda, Azerbaijan and Vietnam in that the survey was an ongoing, regular, large scale, national survey undertaken by government through the Thai National Statistics Office (NSO). The project involved an audit undertaken for NSO and the World Bank of the NSO's ongoing Business Establishment Survey, with recommendations for modifications of design, implementation including data collection and processing, and analysis. Developing plans for staff training and capacity building was also a component, and discussion of operating context both for Thai business and for the NSO was required. The central problem was the low response rate. A full discussion can be found in Santisart et al. (2002a), (2000b), and some more general issues are covered in Lessler and Kalsbeek (1992) and Groves et al. (2002). Here funding for the audit was separate to that for the survey itself; the costing and timeline allowed for two visits by the overseas consultant; the expertise required for the audit itself was available although the project involved staff training as part of the consultation process (that is, the audit was 'action research'); equipment and software for the audit itself was not a constraint; and communication was aided considerably by the number of people involved being bi-lingual in Thai and English and the use of a considerable number of English key statistical terms even in Thai.

Bangladesh, Philippines and Nepal

Although undertaken by different agencies in different counties, these three projects have similar underlying themes. None would have been undertaken without support from international agencies. The intention in all cases was to use a combination of survey and census data to produce finer level poverty estimates than are possible using survey data alone. All involve using only the (almost invariably limited) economic variables in a national census that can be adequately matched

to the existing survey data to predict poverty at household level, which is then amalgamated to small area or small domain level. The poverty variables are collected only in the survey and bootstrap methods are used for the census data to assess standard errors for poverty, assuming the correct model has been fitted to the survey data. Details are contained for example in Haslett and Jones (2004). Poverty assessment at small area level are generally based on a World Bank methodology – see Elbers, Lanjouw and Lanjouw (2001) and (2003). The resource constraint issues are numerous. Data access and official sanction are required and may need considerable inter-agency negotiation, since analysis is required at unit record (i.e. household or individual) level, which raises confidentiality issues. External international consultants are inevitably involved, so that time is limited via fixed budget funding. Additional computer equipment and often software are required, and language issues arise particularly in translation of questionnaires conducted in the local language(s) and then translated into English (since the same word in English may have several local variants with slightly different meanings and vice versa, which is critical when checking the matching of survey and census variables).

Funding for such poverty monitoring is almost invariably through an international agency, and their need to standardise methodology is one reason that the small area poverty estimation methods have become relatively fixed, even though the measures of poverty they require may vary (e.g. income and expenditure related poverty, food expenditure poverty, poverty gap and severity, stunting and underweight in children). This methodological standardisation has happened rapidly because such international agencies need international comparisons of poverty for their real task, not just within county ones, since poverty estimates using standardised methods provide a more objective basis for determining funding allocation for poverty relief programs in different countries.

Priorities and reasons for monitoring

Having outlined these examples, some more general resourcing and monitoring issues can be discussed in context and linked with priorities and reasons for monitoring, especially for situations where resources are strongly limited.

The proportion of total funding allocated to monitoring is generally small, whether resources for monitoring are scarce or not. In some cases (for example GEM - Uganda, World Bank – Vietnam and Azerbaijan) the monitoring and the projects for which the monitoring was required are separate, so that the funding effectively comes from different sources and there is no fixed or negotiable relationship between project funding (in its broadest sense) and the monitoring costs. In other situations, the tension between allocating funds to the projects itself or to monitoring is rather more direct, or even stark. An example is a small area estimation of poverty project undertaken for the World Food Programme (WFP) in Bangladesh (Haslett and Jones 2004), and in Nepal. Intermediate situations are also possible, for example the NSO / World Bank project on Thai business surveys, where one of the direct funding agencies for the auditing was NSO itself, even though the funding stream for the survey per se and the monitoring were not part of the same budget line within NSO.

Even where the funding source for the substantive project and that for monitoring are distinct however, there is an indirect relationship. For an issue to be important enough to warrant monitoring there needs to be community or financial involvement or concern. Funding for monitoring on any issue of importance may temporarily exceed the value of the project, but it will not exceed the perceived long term value of a solution to the underlying problem.

In the context of aid related projects, this can produce a particular distortion to the funding allocation for monitoring, via more expensive and detailed data collection and analysis. The WFP serves as an example. WFP in Bangladesh has a major fieldwork component and in a very real sense, staff in Dhaka already had a very good idea which areas of Bangladesh most need food assistance before the small area estimation was undertaken. A similar situation exists in Nepal. Their regular information from field staff is already at local level, and provides more up-to-date, even if slightly more subjective, information than statistical monitoring using past data can provide. So why then do WFP produce small area estimates and poverty maps at all? Other aid agencies in Bangladesh and Nepal also need the information, but this does not answer the question completely since WFP are already relatively well informed. One reason is that WFP provides food aid in many counties and

an allocation system that has an objective statistical basis is better able to facilitate inter-country comparisons. A second reason is the strong perception that detailed, objective monitoring which allows international comparisons increases aid flows or at least leads to their reallocation; in other words detailed monitoring which is relatively expensive when compared with total project funds is justified where the underlying problem requires much more resource in terms of funding than is available, and high quality monitoring information is perceived as a requirement for gaining that increased project funding.

Of course, where possible an agency such as WFP - whose main focus is on providing food - would rather some other agency carried out and paid for this monitoring. This is only possible however where problems are recognised as being inter-agency. It is nevertheless the reason that small area estimation (SAE) was carried out by WFP in Bangladesh and Nepal but by the World Bank in the Philippines. Both agencies are focused (albeit in different ways) on poverty, and the monitoring requirement provides the link. In many cases inter-agency agreements, which may involve shared responsibility for funding of monitoring, are put in place. Other small area estimation projects have been partially funded by NZAID (Minot et al, 2003). There has been much written and said about 'good' and 'bad' aid organisations. The general debate is not part of the present paper, but the strong parallel need for essentially the same information by different international aid organisations makes it obvious that the distinctions between agencies are not that stark, at least when it comes to small area estimation of poverty.

Monitoring requirements under major constraints – framework

When constraints are strong, the underlying issues that lead to those constraints remain essentially unaltered. The earlier framework and Table 1 are essentially the same. It is the emphasis that changes.

Support takes a wide range of forms, but many are related to preliminaries that require establishing the basis for the project rather than major expenditure relative to the total cost of monitoring. These include establishing government support, writing formal letters for use during surveys and having them sanctioned

especially by local organisations, formalising agreements, making personnel contacts, getting access to data, etc.

Funding, whether for the substantive project or for monitoring is not directly related to the size of the underlying substantive issue. Perceptions of advantage and tractability, and needs of agencies (whether within government or outside it) alter the balance. Aid projects, especially those based substantially on altruism, are at a distinct disadvantage in such a context. Certain types of poverty projects are further disadvantaged because, despite often needing social impact reports, they do not focus on infrastructure in an engineering sense. (Such infrastructure projects include building dams, reticulating water supply, providing electricity supply). Non-infrastructure projects add an extra level of complication because they have a stronger social and local dimension. Social projects (and even infrastructural ones) almost invariably work best with strong local input, and to some extent this mitigates against the emphasis on funding per se. Increasing funding without the required local involvement does not necessarily lead to better projects or to better monitoring. Almost invariably, local solutions are part of what is needed in projects. Such situations can arise even in the case of their monitoring. For example, the World Bank project in Vietnam had difficulties getting local water suppliers to agree to interview until there were further letters of support for the monitoring project from the local water authorities (and to a lesser extent from the Vietnam government and the World Bank). No amount of increased funding alone would have solved this problem.

Time and timelines are linked to planning. Use of such techniques as Gantt charts can be useful, but their apparent internal order can easily disguise underlying problems. Potential bottlenecks must still be foreseen, monitored and overcome. The key is flexibility and having a usable contingency plan when the almost inevitable time delays and unforeseen circumstances develop. For projects which require overseas consultants who are in-country for a limited and usually set period, contingency planning and preparation work can be particularly important, if not crucial. For example in the GEM – Uganda study, it was contact made with the Uganda Bureau of Statistics (UBOS) by the overseas consultant before arriving in the country that was able to save about a month's work, crucial since his time in Uganda was less than two weeks. Such preparation time can and should include

searching for data sources, establishing contacts and gaining permission, all aspects that can at least be begun (and in the case of searching for data sources can often be done more easily - via the internet) in home country. Squeezing-up planning and preparation time almost invariably leads to complications in operation. By the time a survey goes into the field for example, minor problems such as incorrect or omitted coding in questionnaires can easily multiplied from one minor problem in a single draft questionnaire to as many problems as there are respondents. Thought and planning are possible given a reasonable timeline (which may not even add to costs). Sometimes too, local information needs checking no matter how reliable the source. For example, for the World Bank project in Vietnam, the initial estimate of number of water and sanitation suppliers per commune nationally was around four. The actual average was nearer one, and this required changes even after the survey was in the field. Planning and generous timelines in those phases of the monitoring when costs are lowest can often go a considerable way toward balancing the effects of limited funding.

Personnel and expertise are linked. Often a major expense is overseas consultants, usually required because the necessary expertise is not available locally. This is the reason that projects often contain a training component – the idea is to up-skill locals to keep expertise costs down in future by replacing external overseas consultants with local ones. This is more realistic in some situations than others. Much depends on the level of training required. For a survey, training survey interviewers is a necessity. But at a more technical level, it is not possible to provide complete course on survey design and analysis (and particularly on small area estimation) over a few weeks unless building on a strong, existing local graduate (and preferably postgraduate) statistical skill base. There is also the issue that existing staff, even when they have the pre-requisites, are often tied up with other projects and consequently not always available to attend courses. Particularly within government statistical agencies (for example Thailand, Bangladesh, Philippines) the same pre-occupations with other projects tend to limit local involvement in short term monitoring projects themselves, not just in training.

Availability of personnel with the necessary experience can be difficult to assess from outside the country in which the monitoring is

to be undertaken. However a list of personnel requirements (both in terms of expertise and numbers) is strongly recommended and efforts should be made to obtain names, contacts and backups locally before the monitoring is officially begun. Much relies on networks and local knowledge. Long-term international relationships can be key, if simple tasks are not to turn to complicated ones when required expertise is found unavailable because of misunderstandings about what is required. Email can be very useful indeed, but for external consultants a two step process can work best in such circumstances, with a planning period between initial making contacts (as for the Thai NSO/World Bank project), although this is not always possible (for example GEM - Uganda) because it introduces additional budgeted costs. Budgets, like Gantt charts, do require adequate contingency planning, especially where contacts between project staff are initially weak and/or language is an issue. Funding shortages almost invariably lengthen projects, so that where funding is short every effort must be made to plan carefully and to allow additional time for such planning.

It is also critical to establish and update a 'completion path'. It is important to develop a preliminary completion path early during the project, using resources already to hand, particularly for projects where the emphasis is on analysis rather than data collection. For data collection, a preliminary sample design is essential. This can and should be improved if time, resource and availability of additional information permits (as from UBOS in Uganda). Staff training, while very important long-term, cannot be allowed to jeopardise set deadlines for project completion. Where possible it is recommended that personnel training should not be an integral part of monitoring project completion, in the sense that without it the required design, analysis or report cannot be completed. Clearly however, it is sometimes essential (as in fieldwork training for sample surveys, for example in Uganda, Vietnam and Azerbaijan).

Establishing early completion path(s) requires a strong project management overview. Many government statistical agencies, being bureaucracies, prefer to operate on a phased basis (for example all the data is cleaned before any analysis begins) because this is simpler to operate as a clerical task. The major disadvantage is that this does not allow early establishment of a fall-back position, and

working strictly in phases can lengthen monitoring projects considerably.

The hardware and software required for computing vary with the project being undertaken. In some cases both are readily available at least at the fundamental level (Vietnam and Azerbaijan through the survey agency, Uganda through the local GEM research group), or else little computing resource is needed (NSO - Thailand). In analysis-based projects however, such as small area estimation, available software and hardware can be critical limitations without adequate forward planning.

Language can be an issue too. In Uganda the large number of local languages introduces additional complications in comparison for example with Vietnam where the language requirements can be more standardised. This is particularly important when designing questionnaires and during field work training, but it can also become important when survey staff do not share a common language.

In summary, it is necessary to be aware of at least the following possible complications:

- Using overseas expertise increases costs per day, which in turn leads to shorter timelines, less time for statistical modeling, a reduced training component, and strong need for early establishment of a 'fall back' position.
- Project priorities: completion before training. Leads to non-reliance on local technical expertise (as distinct from local knowledge), and to training after 'project completion' only if time is still available.
- Computer equipment and software: often not adequate locally for specialised use, especially for data analysis projects, and this needs to be dealt with at an early stage of the project.

Conclusions

When resource constraints are major, it is necessary to make choices, and it is better that those choices be explicit. Planning needs to be realistic. Contingency plans and early establishment and revision of a completion path are required. None of these considerations would be out of place even when resources are not severely limited.

It may be worth delaying monitoring while adequate initial resources (eg hardware and software) are sought. Where relevant, international funding agencies can be a linchpin. Shortage of financial resources slows projects. Where this additional time is used for careful planning, the slow-down can be an advantage rather than a limitation. However, where deadlines are tight and other resources are also short, major problems loom.

In summary, there are three essential major components, and consequently three major constraints. These components and constraints have more general application than to sample surveys, or even to statistical monitoring.

Good

Given resource constraints the pressure is always to drop standards. This should be resisted.

Fast

Projects conducted at speed require considerable extra planning. Extending the completion date without adding to the total time involved can be useful. However allowing more project time is often only a 'local' solution, because more in-country days for international consultants and additional international travel are usually too expensive. Unless planning and contact is good, and personnel already known to one another, this separation of project staff can lead to loss of project direction and extension of timelines.

Cheap

For many projects the country pays the monitoring costs via loans. This places very strong restraints on funding for monitoring. It also suggests merit in separating funding for project from its monitoring by supporting monitoring by grants not loans, especially where specialised reporting requirements are required by project funding agencies as one of the loan conditions.

For monitoring involving sample survey design and/or analysis, where there are resource constraints, it is not possible to be good, fast and cheap. Being good, fast but not cheap is infeasible given cost constraints. If only two options can be achieved simultaneously, there are only two relevant combinations. It is possible to be fast and cheap but not good, or good and cheap but not fast. Survey related projects which must be undertaken quickly with severely limited budgets are prone to major problems. Given

strong resource constraints, only the latter alternative can be recommended. Since extension of the project once begun can be difficult, it is only through careful, painstaking planning before the project begins that sample design and analysis projects under severe resource constraints have any real chance of success.

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