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TECHNOLOGY AND BALANCED DEVELOPMENT

**Report on the 14th AGUASAN Workshop
June 22 - June 26, 1998**

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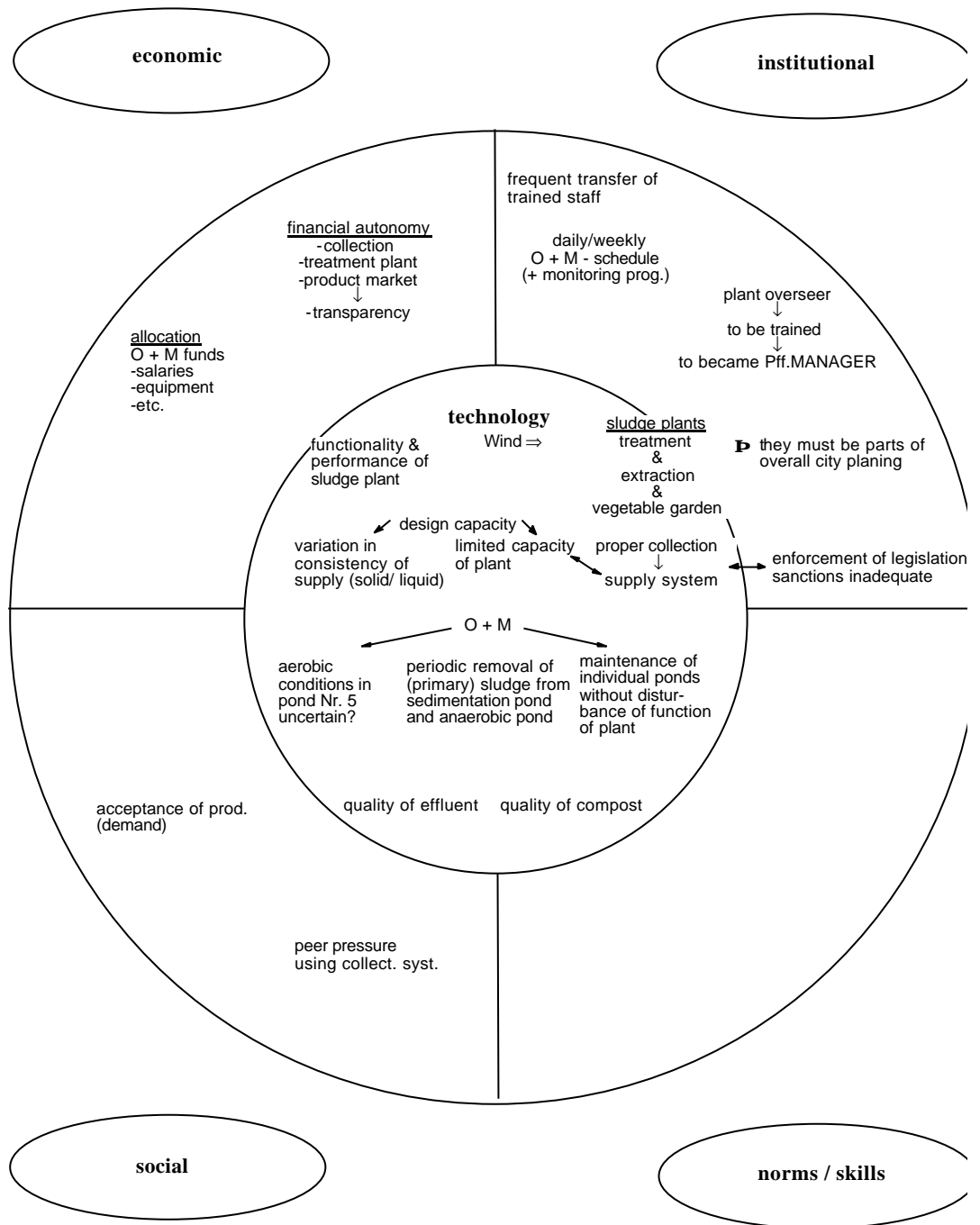
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SUMMARY

All involved organisations, professionals and users are bound to contribute to sustainable drinking water supply and sanitation systems

The 1998 AGUASAN workshop, which was hosted by the Swiss Agency for Development and Cooperation (SDC) and organised by the Swiss Centre for Development Cooperation in Technology and Management (SKAT) took place from June 22 to June 26, 1998 for the 14th time at Rotschuo Hotel in Gersau. This year's topic was "Technology and Balanced Development" in water supply, sanitation and solid waste management projects.

More than 30 participating professionals from all over the world exercised new methods and models for the assessment of sustainability criteria. Facing a world-wide dramatically increasing scarcity of safe drinking water, no doubt is possible about the major challenge of the water sector: *All involved organisations, professionals and users are bound to contribute to sustainable drinking water supply and sanitation systems*. This view is also incorporated in the sector policy of the Water and Infrastructure Division of SDC. The participants realised that sustainability is more than a trite slogan and that SDC's sector policy with its strategy of a balanced development is fully prepared to compete with the challenge of sustainability in water supply and sanitation development activities.

PART A: OVERVIEW OF THE AGUASAN WORKSHOP 1998

1. FRAME OF THE WORKSHOP

1.1 Background information

Challenge:

Drinking water in sufficient quantity and quality is a basic human need, but on a world-wide scale three out of five human beings do not yet have access to safe water and only one out of four enjoy adequate sanitation facilities. The achieved results do not correspond with the human, technical and financial efforts of the past 30 years. The poor in the developing countries suffer from deteriorating frame conditions like population growth, ecological degradation, local and international economic crisis, increasing political and social tensions. Technical, financial and ecological problems, institutional or social gaps and lack of management skills are identified as dominant obstacles, jeopardising balanced development.

International commitment

(Armon Hartmann, SDC)

With regard to water supply and sanitation in developing countries, Switzerland follows a holistic approach as it is endorsed by Agenda 21 of the UN Conference on Environment and Development (UNCED, June 1992). Besides the development and promotion of appropriate technologies and extension of training programmes (e.g. through the UNDP/Worldbank Water & Sanitation Program) it promotes the development of national and international networks which act as coordinators for sector activities. Please refer also to the presentation of the head of SDC's Water and Infrastructure Division and in the SDC Sector Policy on Water Supply and Sanitation.

1.2 Objectives of the Workshop

Main Issue:

Sustainability concerns:

In order to ensure sustainability of programmes and projects, the SDC policy on W&S stipulates the balanced development approach with the following five strategies: **economics** of project implementation can become a major concern for sustainability if the target group's financial capacity cannot come up with the project's demand for monetary contribution, with the absorption capacity of the labour market or other resource management elements. A basic **institutional** concern for sustainability can

occur when the project organisation shows substantial weaknesses that endanger its long-term performance and ability to adjust to the increased qualitative demands, or if it cannot integrate the various actors and stakeholders. A significant **social** concern becomes imminent, for instance, when the target group's cohesion is endangered by the induced changes in life-style or in the disruption of traditional authoritative mechanisms. Another significant social concern can occur with regard to the gender balance. In the field of **rules and regulations, knowledge and skills**, a sustainability concern can evolve if obligations are imposed on the target group without the necessary transfer of skills to the responsible long-term project holders, or if legal impediments exist for a proper project development.

Topic of the Workshop:

In this workshop the **concern for technological sustainability** (and its relations especially to **economic** and **institutional** issues) was selected for a closer analysis. A brief clarification on terminology: The notion of technology usually encompasses more than the technical part; it also refers to economic aspects, and others. For the present workshop it is proposed to use the expression „technique“ for the field of Balanced Development called technology.

Objectives

(refer also to Chart of Objectives in the Annex)

Taking the SDC Sector Policy on Drinking Water and Sanitation as the starting point, the 1998 AGUASAN workshop's objectives are:

- To identify technological, economical and institutional issues that **support or hinder** the sustainable utilisation, operation and maintenance of drinking water, sanitation and solid waste infrastructures;
- To familiarise with methods and instruments for identifying such relationships, and to define related **indicators**.

Expected Results

For the Participants:

To enhance the knowledge and personal managerial competence by learning and practising

- how to find the sensitive issues and indicators in a project with regard to its sustainability
- the application of a tool to assess and plan sustainable technologies.

For SDC:

To test and verify the relevance and comprehensiveness of the

SDC Sector Policy on the basis of the output of the workshop.

To familiarise workshop participants with the Sector Policy of the Water and Infrastructure Division of SDC.

For the Water Supply and Sanitation Sector:

To support the process of learning, mutual exchange of professional experience and network building in order to contribute to the overall aim of the water sector.

1.3 Concept of the Workshop and Programme

Methodical concept of the workshop

In a brief introduction the international frame conditions, the challenge of the water sector and the shortcomings in the implementation were visualised.

With the introduction of a workshop pilot case (Solar Disinfection of Drinking Water, SODIS) and a first input about the definition of „issues“, the participants were requested to elaborate ”issues” of the pilot case in working groups.

After a further explanatory input on the definition of indicators the working groups elaborated indicators for the SODIS pilot case.

Thereafter, 6 case studies were presented by the resource persons. The working groups applied the introduced methods to the six case studies.

In intensive discussions within the working groups, complemented by feedback sessions with ”neighbour” groups, the corresponding ”issues” and ”indicators” were defined for all the 6 study cases. In addition, to emphasise the ”marketing aspect” of the process, the groups had the task to arrange their findings on four posters for a final "market" to take place on the last workshop day. On the market the participants could visit the other projects and get information on the findings of other groups.

With a review session where opinions and the impact of the workshop on the participants' personal work were exchanged in the plenum and a final feedback of the resource persons, the 1998 AGUASAN workshop entered its final stage, the closing ceremony.

Programme:

First day (June 22, 1998)

Opening of the workshop:

- Programme and objectives
- Personal presentation of participants
- Presentation of the context in the water sector
- Introduction of the SODIS show case and questions of clarification

Second day (June 23, 1998)

Looking for indicators in three fields

- technical
- institutional
- economic

and applied on the SODIS case in working groups.

Short presentation of the six cases

Third day (June 24, 1998)

Presentation of the different cases in the working groups by the resource persons

Excursion

- Introduction
- Visit to research station Kastanienbaum
- Discussion with researchers
- Exchange of experiences

Fourth day (June 25, 1998)

Elaboration of indicators for the technologies of the six different cases including an exchange of findings among the working groups

Preparation of the results for the market

- Discussion in subgroups
- Preparation of the presentation

Fifth day (June 26, 1998)

Market exchange of the results of all working groups

- Exchange of findings
- Lessons learnt
- Transfer to the own working reality

Evaluation of the workshop by looking back and forward

- Listing topics for the next AGUASAN workshop
- Evaluation of the workshop

Closure of the workshop.

2. THE CONTRIBUTING BODIES

2.1 Patronage of the Swiss Agency for Development and Cooperation (SDC)

Financial and professional assistance

Thanks to the lasting support of SDC and especially of the head of the Water & Infrastructure Division that already the 14th workshop could be held this year.

SDC not only supports the workshop and the water and sanitation sector, but also contributes with practical inputs and the experiences of their desk and project staff.

The AGUASAN workshop is regarded as an important event where professionals of the water sector can actively contribute and exchange their views and experiences.

2.2 The Management of the Workshop

The AGUASAN group

Preparation, organisation and execution

The workshop is prepared and organised by the preparation group of AGUASAN which is an informal alliance of governmental and private Swiss organisations engaged in the drinking water supply and sanitation sector. For the execution the group is supported by a professional moderator, topic specialists and a reporting person. The present composition of the AGUASAN group is shown in the list of participants (Annex).

SKAT

Administrative and logistic guidance

SKAT (Swiss Centre for Development Cooperation in Technology and Management) was entrusted with the administrative and logistic workshop preparation and management.

2.3 The Participants

From all over the world to Gersau

About twenty participants joined from all over the world. The willingness and motivation of the participants mainly determines the success of such a workshop. The friendly atmosphere, the performance in the working groups and the frank discussions in the plenary sessions do honour the participants from Bangladesh, Burkina Faso, Cameroon, Ethiopia, France, Germany, Ghana, India, Kenya, Mozambique, Netherlands, South Africa, Sri Lanka and Switzerland.

Practical networking: a complete list of the participants is shown in

3. AN INSTRUMENT TO IDENTIFY AND MONITOR ISSUES THAT SUPPORT OR HINDER PROJECT SUSTAINABILITY

The present chapter summarises the conceptual thoughts and methodical tools presented to the workshop participants by Urs Geiser and Erfried Neubauer. It starts with a concrete example, and gives some general hints considered crucial in searching issues and indicators. A possible procedure to arrive at issues and indicators is then outlined, and useful methods are described and illustrated.

3.1 An example

An Example for illustration

The present example is based on the drinking water and sanitation project PROPAR in Honduras (for details see AGUASAN Workshop report 1989, or the article by Peter Tschumi in *Waterlines* Vol. 10, No. 1, 1991). During project planning in PROPAR, the project team shared a concern for sustainability. Based on intensive debates, it identified several issues considered important to ensure sustainability (see Fig. 1). These issues, however, were still rather general, and the debate continued to further detail these issues (see the example of "Effectiveness of O&M" in Fig. 1).

Having identified the issues of concern regarding sustainability in a more precise manner, the project was interested in observing the development of these issues during the further course of project implementation. The question therefore arose: how to monitor the identified issues, and: which "things" to observe and record that can give "indications" on the developments of the issues. Thus, the issues were made even more precise until they fulfilled the demands placed upon indicators (see Fig. 1; more details on indicators including calibration are given further below).

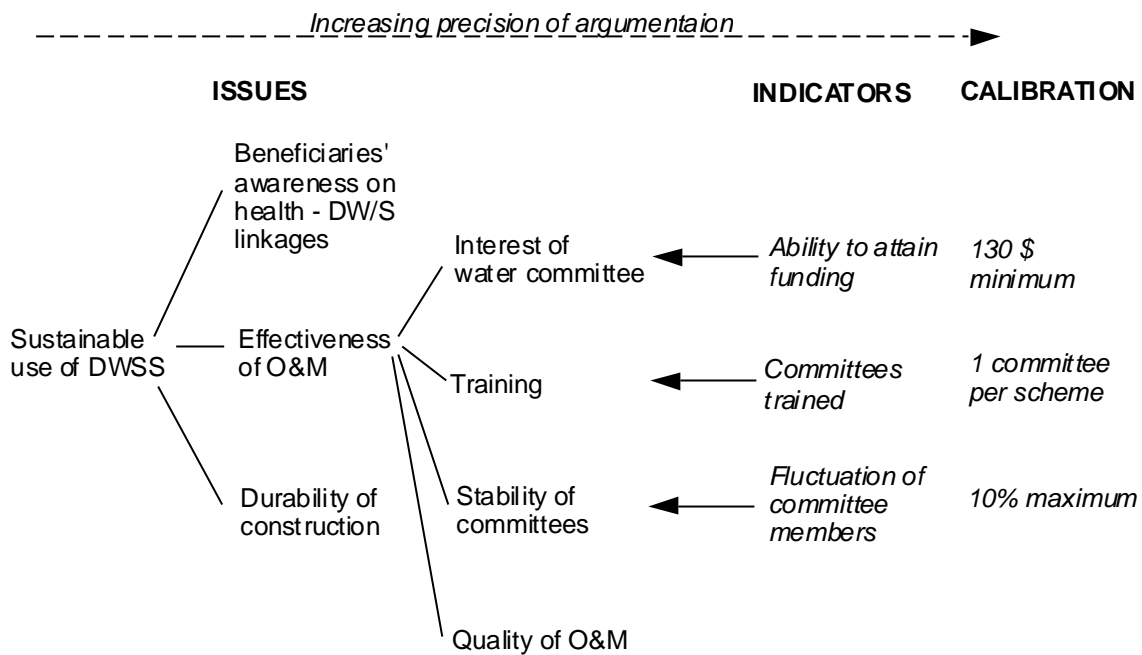


Figure 1: Issues and Indicators in the PROPAR example

3.2 Conceptual Hints for the Identification of Issues and Indicators

The example given above already illustrates a number of points that are crucial when looking for issues and indicators. Some of them are:

First the Issues, then the Indicators

Having a concern for sustainability, project members often search directly for related indicators. However, indicators can not be identified directly; as the example illustrates, an intensive debate on the details of the "sustainability concern" is required first. Only once these **issues** are identified in a reasonably detailed manner, **related indicators** can be looked for.

Methodically, it is therefore advisable to proceed in two steps:

- First the debate on the issues ("What are the issues that support or hinder sustainability?");
- second the identification of indicators for these issues ("How can we observe and study these issues in the field?").

The outcome of the debate depends on those involved

Discussions and **debates** are the cornerstones in the search for sustainability issues. This means that the identified issues depend to a great extent on the people involved in the debate. **Often, project-related discussions take place between project staff only. Increasingly, however, the involvement of the project**

beneficiaries (or target group) is sought.

3.3 A possible procedure

Procedure

The above introduction describes the main steps involved in identifying issues that support or hinder sustainability. These steps are summarised in Fig. 2. It starts from a **project** (or programme) that has a **concern for sustainability**, and that is interested in **generating feedback** in order to either confirm its way of working, or to identify required corrective measures. In order to arrive at the required feedback, the project first debates on the **issues** it considers crucial regarding sustainability. Once these issues are identified, related **indicators** are defined. Often, long lists of indicators result from such discussions, and a **prioritisation** of issues and indicators is required. Finally, the indicator **data are collected, analysed**, and – based on the interpretation of the findings – **recommendations** are formulated, which should form the basis for corrective measures in project activities.

All these steps are further explained in the following chapters.

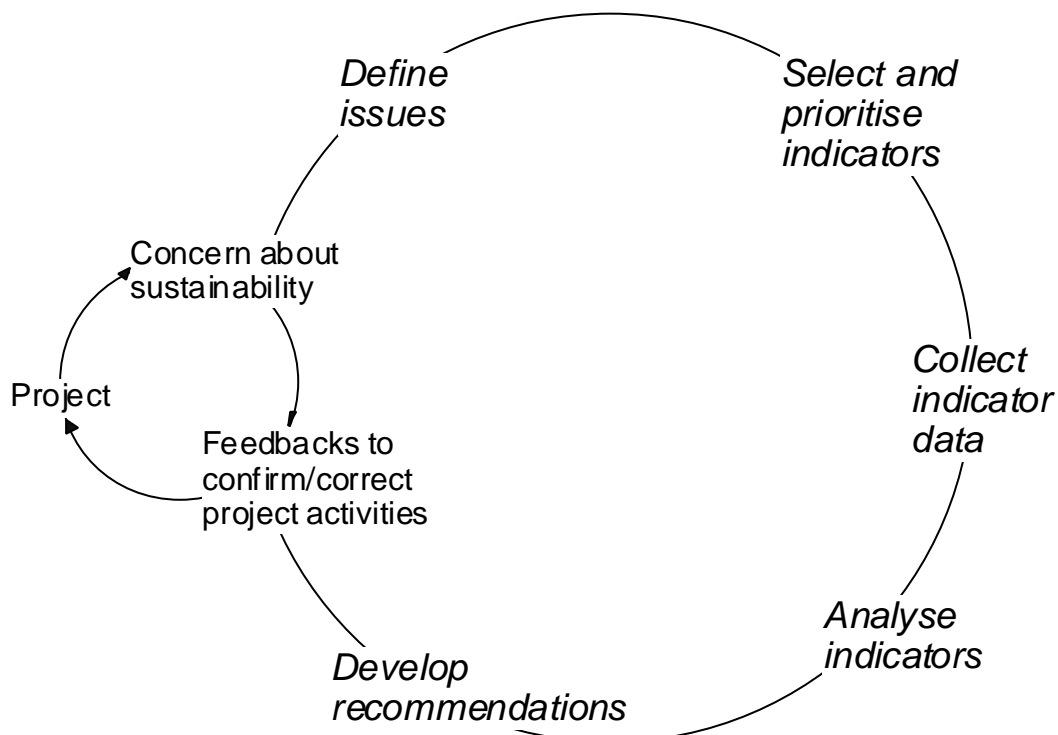


Figure 2: Overview on the proposed procedure

3.4 Defining issues

Brainstorming, workshoping

Issues are identified through brainstorming and workshoping which can be supported by one's own experience, by consulting existing documents and policies, and by using conceptual modules. **Brainstorming** and **workshoping** are two main methods recommended. Often "discussing" is not considered as a "method" and one searches for more "sophisticated" procedures. However (and as this AGUASAN Workshop has proved it again), properly organised discussions yield an enormous amount of insights – and thus, brainstorming and workshoping are fully justified to be considered as methods (see Fig. 3).

Experience

Brainstorming and workshoping depend on the involvement of the participants – and specifically on their **experience**. Experience is a main "source of wisdom" to support the identification of sustainability issues.

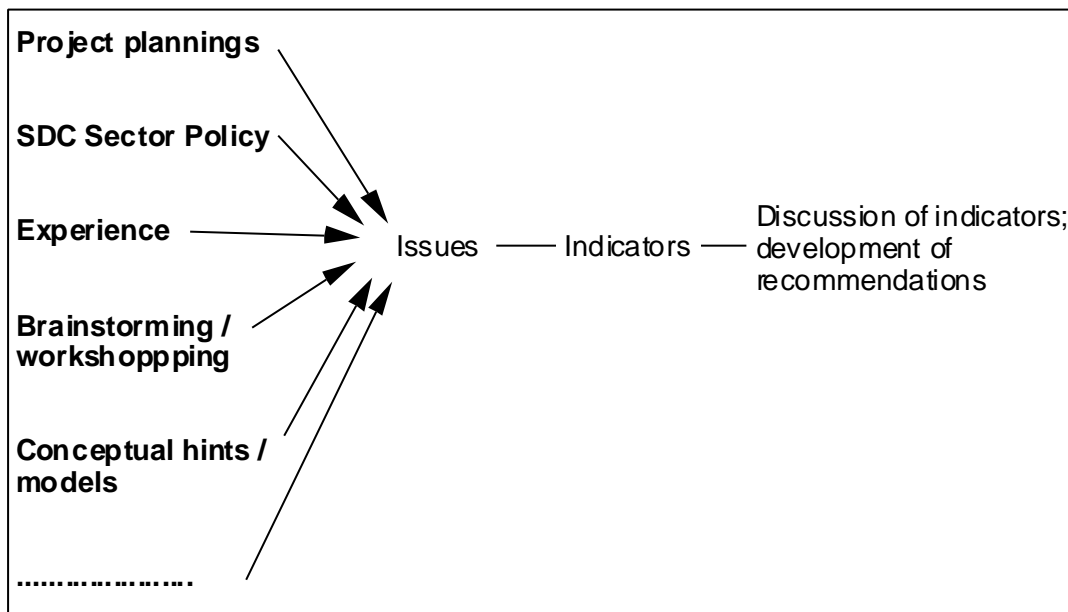


Figure 3: Instruments for the identification of issues

Documents

Existing **project documents** often contain information generated during earlier brainstorming, and these can be helpful in identifying issues too.

Other documents may be considered. For example, there are many documents emerged out of international discussions and exchanges on the topic of DWSS.

Existing policies

There is the **SDC Sector Policy** with hints at sustainability issues. It introduces the concept of Balanced Development with its five interdependent fields. These fields can be visualised as shown in Fig. 4 and thus be used as a "tool" to support and structure

brainstorming. Fig. 4 shows that one field of Balanced Development is placed at the centre while the others are placed around it. In the present workshop, technical questions are placed centre stage; however, the linkages of technical issues with economic and institutional are addressed as well, while those regarding social issues, and questions regarding knowledge/norms are – though not forgotten – not discussed further at this stage. However, another field of Balanced Development could be "in the centre", and its linkages to the other fields could then be discussed.

Conceptual models

Conceptual hints or models can be used for a better understanding of one's own project reality and the wider context within which it operates. One such "model" is presented in chapter 4.

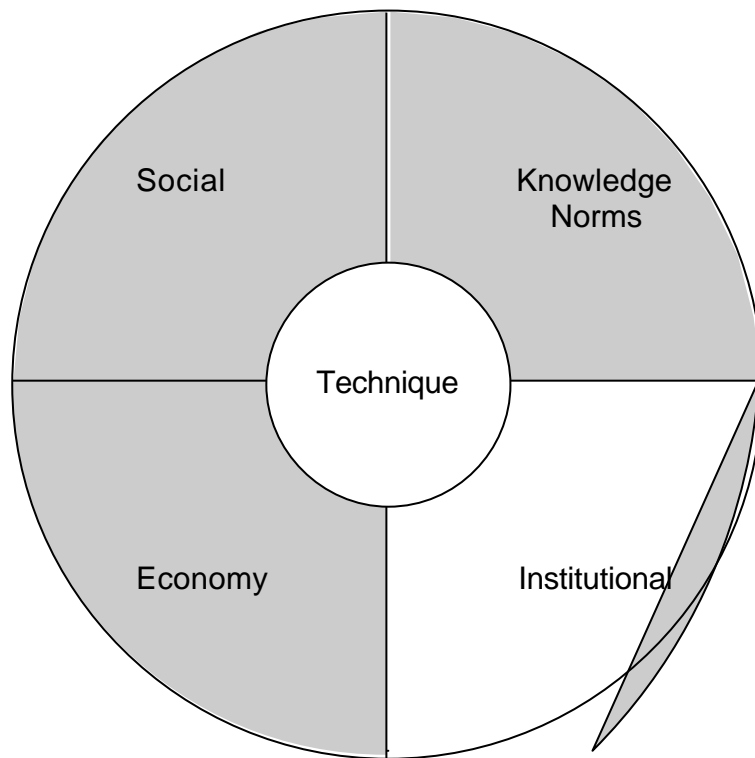


Figure 4: Technology and the other fields of "Balanced Development"

3.5 A Market-oriented model for public product and service provision

Conceptual models can be one of the tools for the identification of relevant issues. The one presented here (Fig. 5) shows the market relationship of public products and services. It departs from the existence of a **Need** (which may be a 'Basic Need', but this is not a condition) on the **demand side**, e.g. for water. Very often, a rather common misconception is that the existence of a certain need will immediately result in the articulation of a **demand** for an

'adequate' satisfaction of the same. This is even more so as the public sector will normally provide for adequate need satisfaction through a corresponding product or service. In case of 'Water', for instance, the public sector will normally provide the product of 'Safe Water' at the disposition of the users (or consumers).

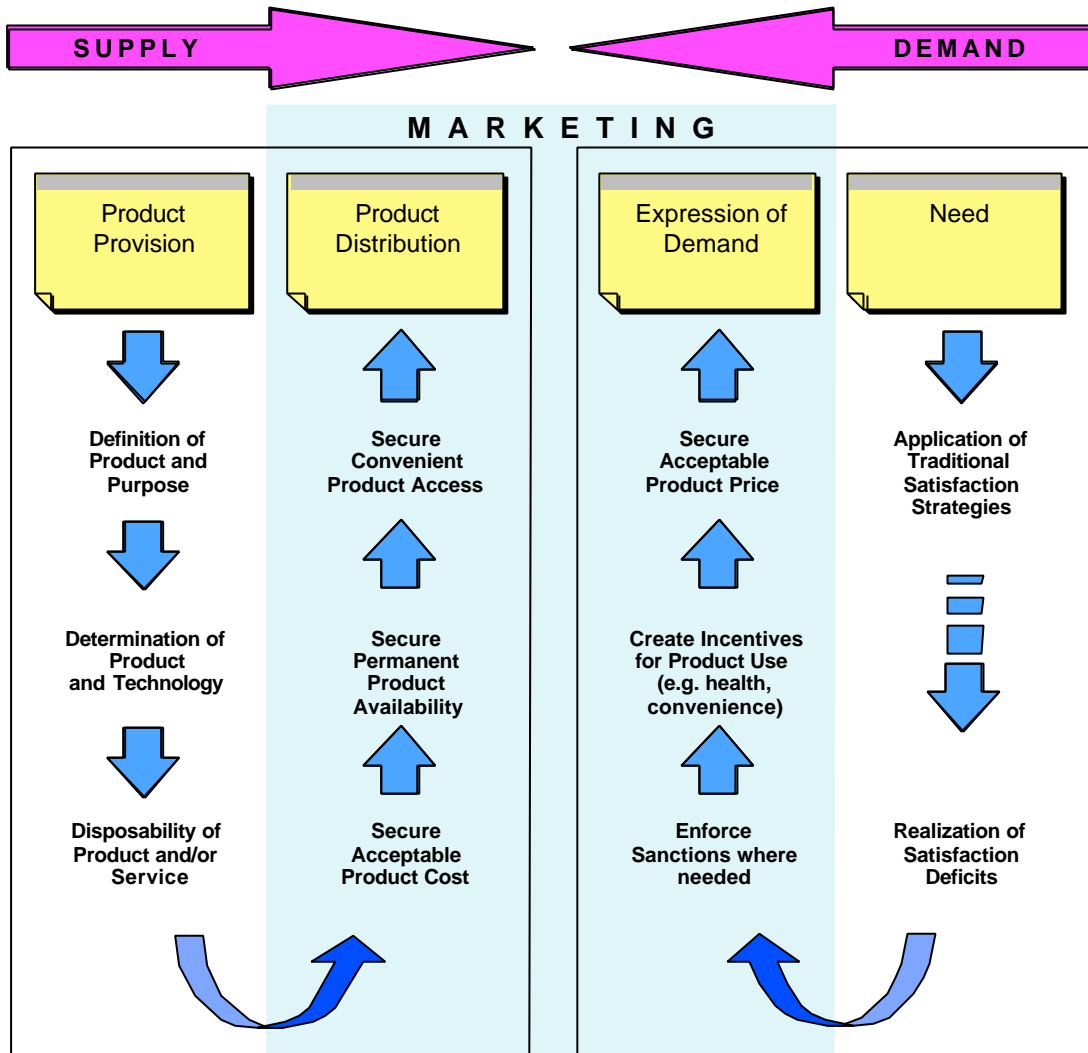


Figure 5: Market-oriented model for the provision of public products and services

The mechanisms ensuring that the demand meets the supply can be described as **marketing tools**, both on the side of the producer and on the side of the consumer. Needs are normally satisfied through **traditional strategies**, like fetching water from the river or from a water hole. Although the various deficits of traditional need satisfaction are normally felt by the consumer, a market-oriented demand for the product will only be expressed if he/she is convinced of the advantages of the product. The consumer must be aware of the fact, for instance, that the 'safe

water' supports his/her health, that it is more convenient to use and that it probably saves resources and energy (labour, fuel-wood). Only then the consumer will be prepared to pay a market-oriented price for the product.

The important marketing tools on the demand side are therefore to **create awareness** and to provide **incentives** on the consumer side, which finally will stimulate the demand. In some cases, also the enforcement of **sanctions** can be used as a stimulant for the demand, where this is necessary to protect the public interest (e.g. regarding the deposit of solid waste in public space). Wherever possible, however, it is preferable to stimulate demand through incentives, rather than sanctions, as their enforcement poses constant problems and may even result in corruption.

A key marketing tool on the demand side is the '**acceptable price**' for the product. If the price (e.g. for 'safe water') is beyond **affordability** for the consumer, he/she will revert to the traditional strategy of need satisfaction and ignore the better product, despite being convinced of its usefulness.

The various elements on the demand side must be complemented by marketing tools on the supply side. Among the most important ones are the permanent **availability** of the product and the provision of a convenient **access** for the consumers. Unreliable supply undermines confidence in the product and lacking convenience can prompt consumers to revert to the traditional satisfaction strategy, despite other important incentives. Another critical element on the supply side will be the **product cost**. Although it does not necessarily have to coincide with the product price, it is certainly its main determinant. If the product cost is above the acceptable product price, there will be a need for subsidies, which *a priori* distort the market mechanism. Distortion can also occur in case of acceptable product costs, when an unduly high profit margin leads to an unacceptable product price. This can especially be the case if the product is marketed under a full commercial set-up or in private-public partnership.

So far the proposed conceptual model that tries to give more attention to the market interactions between demanders and suppliers of DWSS services. The model cannot exhaustively identify all the relevant issues in public product and service provision but it identifies a number of areas, which are relevant in this respect. The emphasis on the marketing aspect further shows that an active role has to be taken beyond the mere provision of a product and the existence of a need.

In summary, the essence of the model can be expressed in the following key questions:

- What is the **need** that is going to be satisfied better than in the traditional way?
- What is the **product** to be offered for adequate need satisfaction?
- How is **adequate access** to the product provided for the consumer?
- How is the **expression of demand** for better need satisfaction being promoted on the consumer side?

3.6 From Issues to Indicators

A Process of Iteration Once the broader issues are defined, the process of refinement and precision is required to identify various sub-issues (see the process of increasing precision mentioned above) in line to finally arrive at the definition of objectively quantifiable **indicators**. Indicators have to fulfil a number of requirements which are shown in Fig. 6.

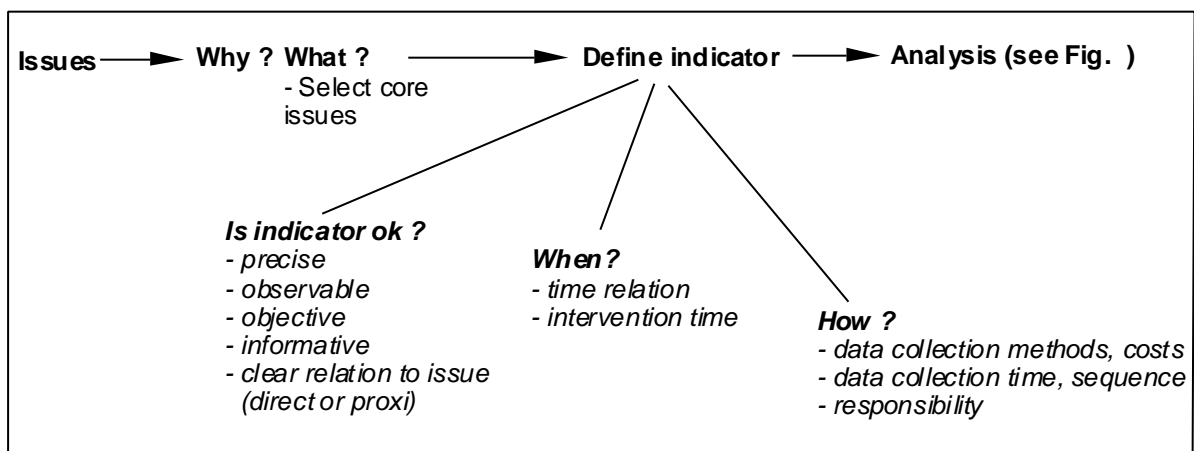


Figure 6: Requirements for Indicators

Why to observe? This point seems to be obvious, but is often neglected. At this stage it is important to ask: Why do we want a feedback on certain issues, and are we ready to accept the feedback. Although such questions are not linked directly to the definition of indicators, we still have to ask them before defining indicators.

What to observe? The discussion on issues may already have yielded a considerable list of potential topics (issues) for which indicators would have to be identified. It is often advisable at this stage to prioritise the list, and to select a number of **core issues** for which indicators are

then defined.

*Is the Indicator
adequate?*

The crucial step now is to define the indicator for the selected topic. There is actually no "magic" in this step; it just requires a (patient) further clarification and precision of the issue. This process of precisioning continues until the "indicator" fulfils certain requirements. These are:

• *Precision :*

For an indicator to be precise enough, i.e. ready for an objective measurement, it must be quantifiable. This does not necessarily imply that only physical quantities should be used for the indication of a situation or condition (e.g. number of coliforms per unit of water). Also qualitative statements can be quantified and used as indicators. For instance can the public acceptance of a certain technology (e.g. a new water treatment system) be measured by the number of positive and negative press reports about the subject within a certain period. Other indicators may use the qualification into 'good', 'fair' and 'poor' for the characterisation of a condition.

• *Observability :*

Indicators should be observable, i.e. it should be clear as to what to observe, measure, or describe.

• *Informativity :*

Indicators should be informative, i.e. they should allow meaningful analysis and development of recommendations.

• *Clear relation to issue:*

Indicators should provide information about the issue under discussion as precise as possible. This means that both, indicator and issued should have a clear and direct relation to it. All the indicators shown in the example (see Fig. 1) fulfil this requirement.

Sometimes, however, it is very difficult (or even impossible) to identify indicators that directly relate to an issue. In such cases, indirect or **proxi indicators** are required. This is illustrated in Fig. 7 which is again based on the PROPAR project. The project team also tried to further precision the issue of "beneficiaries' awareness" (compare with Fig. 1). It found that three sub-issues are required to arrive at sufficient clarification. Coming to indicators for these three (sub) issues, the project team realised that they can not be directly observed in the field: "acceptance of latrines" for example can not be "seen"; therefore, they selected an indirect "indication" on "acceptance of latrines", namely: "population covered by latrines in project area" (though not a very

"informative" indicator).

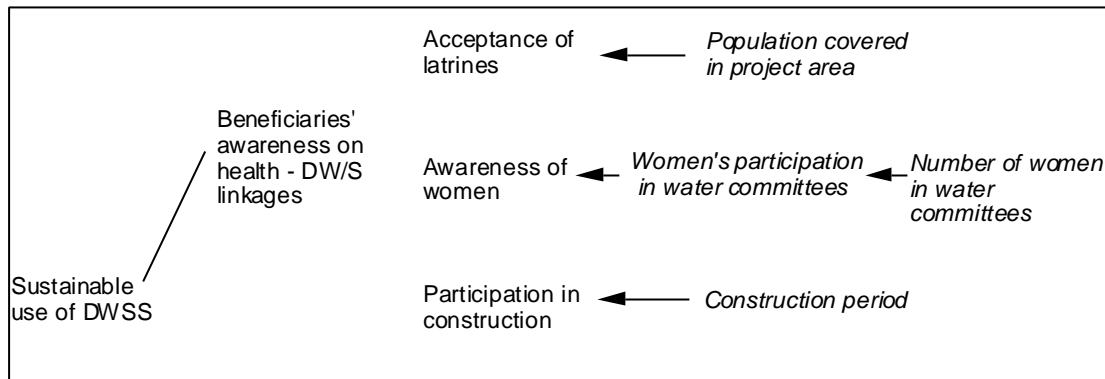


Figure 7: Direct and proxi indicators (compare with Fig. 1)

Time Relation of Indicators

Indicators must be replicable. To reflect a trend, an indicator has to be observed in a certain frequency. Thereby, the observation frequency is determined by the **required intervention time**, i.e. the time span during which a feedback – based on recommendations emerging from the observation of indicators – is still meaningful. In other words: it may be useless to study indicators over a long period of time, when the project has already changed its related activities.

The required intervention time may be very short in some cases (possibly seconds or minutes) and very long in others. The observation of water quality in a water supply treatment plant may, for instance, require very frequent observations to detect potentially dangerous levels of contamination and to be able to intervene in time. On the other hand, when it comes to the measurement of changes in human behaviour, the measuring frequency may be in annual intervals, as short-term interventions in such a process are hardly successful.

Data Collection Requirements

The selection of indicators also has to consider the necessary means of verification, i.e. the requirements for data collection. In general, it can be stated that physical quantification is the most reliable form of verification and should be preferred, whenever possible and easily accessible. Where this is not possible, the use of proxi indicators like test fish, test plants, etc can be useful (see above).

Other already existing sources of data (the availability of which can influence the formulation of indicators) are quantitative records kept by relevant organisations in sufficiently frequent intervals like accounts figures, budget figures and statistical data. Whenever

possible, the conduction of direct surveys should be avoided, as they are difficult to organise, to finance, to interpret and to repeat in regular intervals. Household surveys are often conducted in regular intervals by the statistical authorities and can often be used as a reliable database, without the need for primary data collection.

3.7 Reliability of Data Collection

Reliable data collection is a primary requirement for the quality of the indicator. For critical issues (e.g. drinking water quality) it is often essential to use control indicators to test the reliability of the main measurement. After collection, results must be compiled and visualised. It is most important that this step is done regularly, immediately after collection to avoid the piling-up of raw data.

3.8 Data Analysis

For data analysis and interpretation it is essential to **calibrate** the indicators to allow for an assessment of the observed situation (see Fig. 8). This is often easy for physical indicators and can be very difficult for qualitative indicators.

Nevertheless, even for technical measurements this often requires an interpretation process that is found through discussion rather than direct physical interpretation. Which level of turbidity is still tolerable in drinking water? Which number of coliforms can still be accepted from a health point of view? Basically, the calibration process will require the following steps to arrive at a satisfactory result:

- Analysis of the consequences of alternative threshold values (with regard to health standards, costs, public opinion, convenience, etc.);
- Technical, political, economic and social discussion of alternative threshold values with relevant stakeholders and actors;
- Agreement on a 'desirable' threshold value among the stakeholders and actors.

Data calibration which will indicate the 'acceptable' level of the indicator is often combined with a time target, until the desired indicator level should be reached.

The following example (Fig. 9) shows a hypothetical ‘Acceptance Indicator’. The quantity and time-related calibration assumes that an acceptance level of 70 % (e.g. in the target group, among politicians, etc.) would be satisfactory and should be reached by the year 2000. The graph shows that in this case the desired level has already been reached in late 1995 and, by 1998 has already reached about 80 %. Thus it is fully within the acceptable range already before the target year.

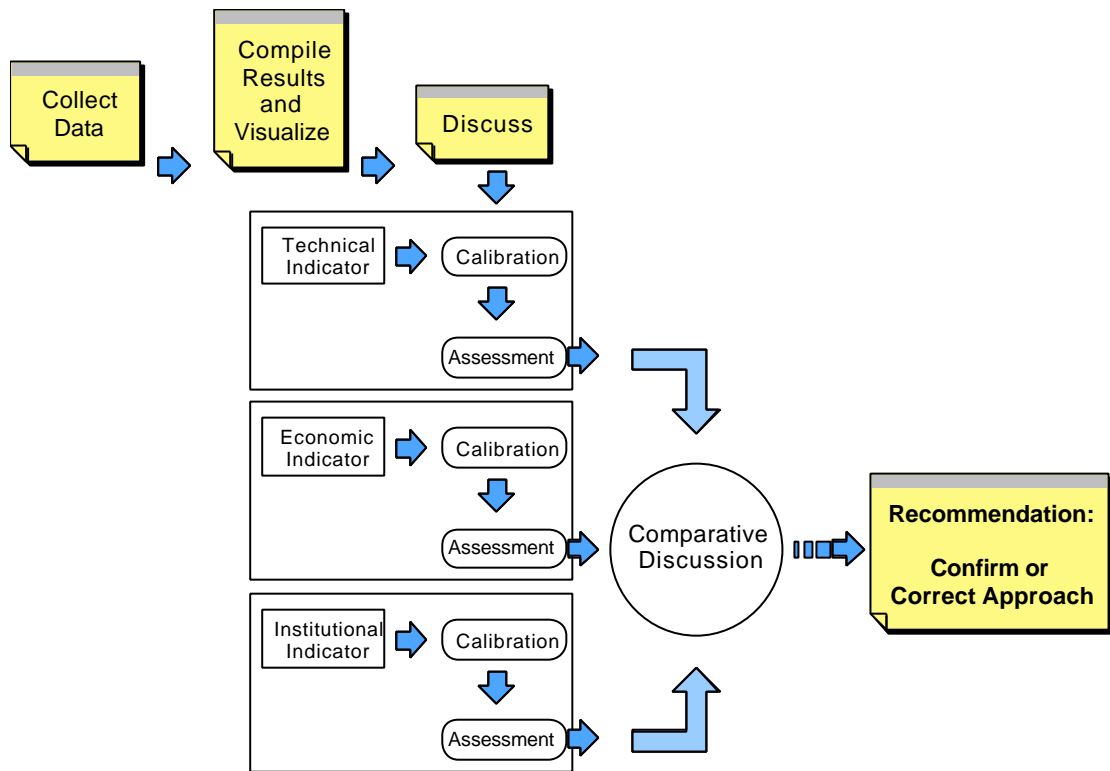


Figure 8: The Process of Data Collection and Analysis

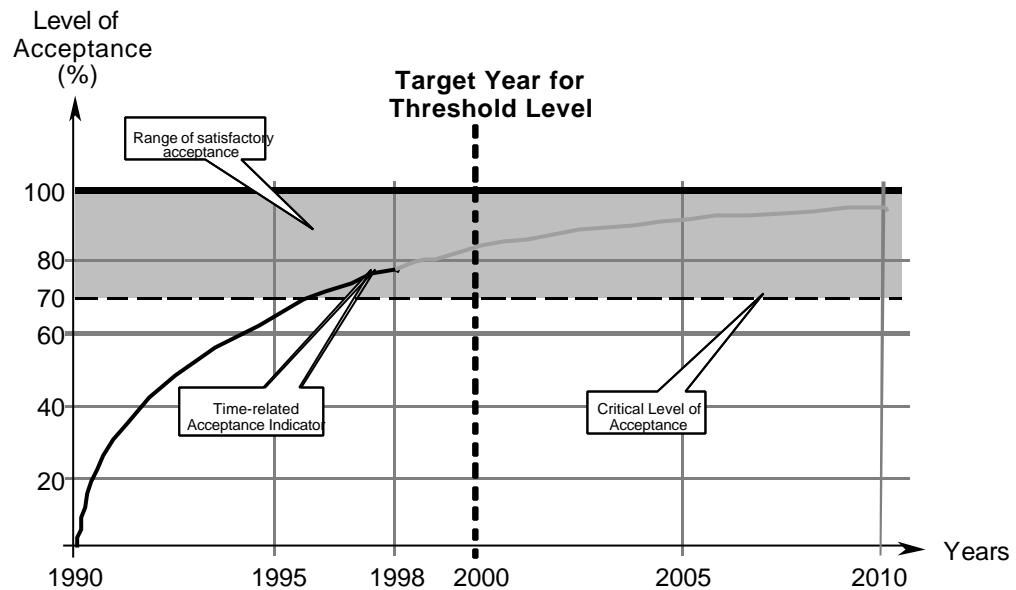


Figure 4: Calibration of an Acceptance Indicator - An example

4. COMMON FINDINGS

4.1 With regard to the sector policy

The work on the six study cases has shown that the sector policy can be applied in various types of water supply and sanitation projects. It is felt that following the SDC sector policy can definitely contribute to the sustainability of water and sanitation projects. Although the choice of technology seems to be a key aspect with regard to sustainability one should not forget the institutional, social, economic aspects as well as the importance of existing norms and knowledge. Only if these fields and the transsectoral aspects of nature and ecology and its interrelations are incorporated in all phases, the projects may contribute towards a balanced development.

4.2 On programme or project level

Ten years ago the project activities focussed on the transfer of a technology. Today it is more a technology management which includes an adequate and user-friendly handling in the context

(social, economic etc.).

The choice of technology is an important part of a project or programme concept and for the achievement of a balanced development as decisive as the strategies of the other fields of the sector policy. All the participants experienced the rigid relationship between the various contextual fields.

The identification of issues and indicators was felt to be a powerful tool for the planning, design and implementation of a project. The instrument allows to open up the mind to see new potentials and hidden bottlenecks of the project. It is considered a useful method also to make things easier and structure the way of thinking. Sometimes it is extremely difficult to find appropriate indicators for a previously identified issue. The process of refinement is important to make the indicators as precise as possible.

4.3 On the personal level

The participants expressed that courses like AGUASAN where professionals are allowed to exercise new working methods and include their personal experiences are very effective and helpful.

PART B: PROCEEDINGS OF THE WORKSHOP

1. OPENING OF THE AGUASAN WORKSHOP 1998

1.1 Welcome and Introduction

The spirit of AGUASAN

In his welcome address, Karl Wehrle expressed his strong belief that the participants of the 14th AGUASAN workshop have the power, the knowledge and experience to enter a process of developing ways and means to tackle the impending challenges over sustainability in the water and sanitation sector.

1.2 Selection of the workshop topic

History of the AGUASAN Workshops

(refer to Annex 3.2)

The themes of the past workshops are important to understand this year's topics. After the first workshop of 1984, which comprised appropriate technologies in water and sanitation projects, the political, social, institutional and economic matters have been selected for discussion. It lasted more than ten years until the field of technology moved again into the centre. It is anticipated that, with regard to the balanced development, the applied technology and its related issues are as important as the other fields of the project context.

Ideas provided by the participants of the previous workshop

Referring to the history and in line with the tradition of AGUASAN, the subject of the workshop is elaborated from ideas provided by the participants of the previous workshop in this way the theme "Technology and Balanced Development" has been defined as the workshop topic for this year.

Observations made in the field - SDC's Sector Policy

To illustrate the topic and as an introduction to the objectives of the workshop Karl Wehrle presented some observations and shortcomings he identified on his visits to several development projects during his sabbatical year in 1997/98.

He explained that technical issues of rural infrastructure projects were increasingly treated as the least problematic side aspects. However, his observations of unprotected catchment areas, leaking reservoirs, tapstands without drainage facility, dry prepaid standpipes etc. drastically changed his mind in this regard and created a new awareness about the technology aspect.

1.3 Objectives and expected results of the workshop

Objectives of the workshop

Karl Wehrle presented the objectives and expected results of the workshop, which are also summarised in chapter 1.2 of part A (for details also refer to Annex 3.2).

1.4 Explanation of the programme

Moderation

Tonino Zellweger explained the programme of the workshop as well as the further topics of the afternoon session of the first day.

1.5 Global context - SDC's Sector Policy

Global drinking water situation

Armon Hartmann, Head of SDC's section "Water & Infrastructure" emphasised the dramatic situation that today drinking water is the most endangered and over-utilised natural resource of the world. During the coming decades a growing number of people and countries will face acute water scarcity. Whereas in 1950 20 million people were living in countries suffering under water scarcity, this number has increased to over 300 million people today.

The magnitude of the problem calls for actions on all levels and SCD follows a strategy of working through existing water networks. SDC supports various organisations and bodies that were established to compete with the challenge of increasing water scarcity. Among these organisations are:

- the World Water Council, an international water policy think tank and its Global Water Partnership which is mandated to translate the so-called Dublin Rio principles and
- the Water Supply and Sanitation Collaborative Council were mentioned.

SDC's expectations from the workshop

The Head of SDC's "Water & Infrastructure" division combined his remarks on SDC's Sector Policy on Water Supply and Sanitation with the expectation that the workshop may give evidence on the validity of the Sector Policy. One of the main thesis of the sector policy is that the objective of a balanced development can only be achieved if projects or programmes are embedded into the socio-cultural and natural environment. The applied strategies concentrate on five related fields:

- the **social field** includes aspects of motivation measures, active participation and gender-balanced development,
- the **institutional field** covering the aspects of division of tasks between Government, other institutions and the community (community-based management),
- the **economic field** covers aspects of financing and resource management,
- the **technological field** covers aspects of technical installations (appropriate technology),
- the **field of knowledge and norms** covers aspects of rights and responsibilities, as well as of training and transfer of know-how.

Armon Hartmann concludes his presentation with the slogan "*Every drop of water counts*".

1.6 Personal Presentation

Each participant was requested to write down his personal data and present name, institution, professional background, and experiences together with a "life slogan" to the plenum.

As a reminder (have fun with the quotation of) some life slogans:

- " The best contribution of unbalanced people to a balanced development is to develop the own balance."
- " Things work better with dissemination of experiences."
- " Success comes with commitment."

2. WORKSHOP PILOT EXAMPLE CASE: SOLAR WATER DISINFECTION (SODIS)

2.1 Project Description

by Martin Wegelin

SODIS in Brief

Micro-organisms are vulnerable to light and heat. Solar energy, universally available and free of charge, is used in the water treatment process termed as solar water disinfection (SODIS). Transparent half-blackened containers are filled with water and exposed to full sunlight for several hours. SODIS may be used as batch process at household level to treat small quantities of drinking water in bottles or plastic bags. However, since the daily capacity of the batch process is limited by the volume of water stored in the sun-exposed bottles, SODIS can also be used in continuous-flow systems, comprising solar collectors and heat exchangers to significantly increase the daily drinking water output.

Approach of the SODIS Project

Phase 1:

In 1991, EAWAG/SANDEC embarked on an extensive laboratory and field test project to assess the potential of SODIS and to develop an effective, sustainable and low-cost water treatment method.

Phase 2:

Field tests were carried out in pilot plants in Colombia, Jordan and Thailand in order to develop equipment and operating guidelines for the water treatment method.

Phase 3:

Demonstration projects with local partners in Africa, South America and Asia were established to study the socio-cultural acceptance and affordability of the SODIS water treatment method.

Next Phase (planned):

With national workshops attended by key persons from authorities, NGO's and national research institutions it is expected to launch follow-up programmes aiming at disseminating SODIS on a large scale.

Results

Solar water disinfection can be applied effectively if a solar radiation intensity of at least 500 W/m² is available for about 3-5 hours. Thereafter, it can be expected that 99% and more of the harmful pathogens have been destroyed by the disinfection process. Lower intensities of solar radiation require longer

exposure times or the use of alternative treatment processes. Pre-treatment by storing the water for 3-5 hours might be necessary since the raw water should be of low turbidity and virtually free of solid matter. Larger parasites such as cysts and worm eggs, which cannot be reliably destroyed in the solar disinfection process, are also removed by sedimentation.

Since the treatment process is limited in capacity, it should be applied to treat small quantities (2-3 litres per person and day) of drinking water only.

The field tests confirmed the laboratory results. As soon as the water temperature reaches 50°C, the inactivation process is accelerated and usually leads to complete disinfection.

Plastic bottles are the favourite type of container.

The demonstration projects revealed an overall positive response of the participating households. The users find the treatment method very practical and helpful, easy to handle, as well as time and fuel saving.

2.2 Group work on the identification of issues

Group work

After an explanatory input of Urs Geiser and Erfried Neubauer on the definition issues four working groups were formed to answer the question "What are the technical, economic and institutional issues that support or hinder the sustained use and dissemination of SODIS?". It was proposed to work according to the following steps:

- collect issues in the three fields (technology, institution and economy) and start with brainstorming on technical issues
- choose from each field one issue to begin with.

What are the technical, economic and institutional issues that support or hinder the sustained use and dissemination of SODIS

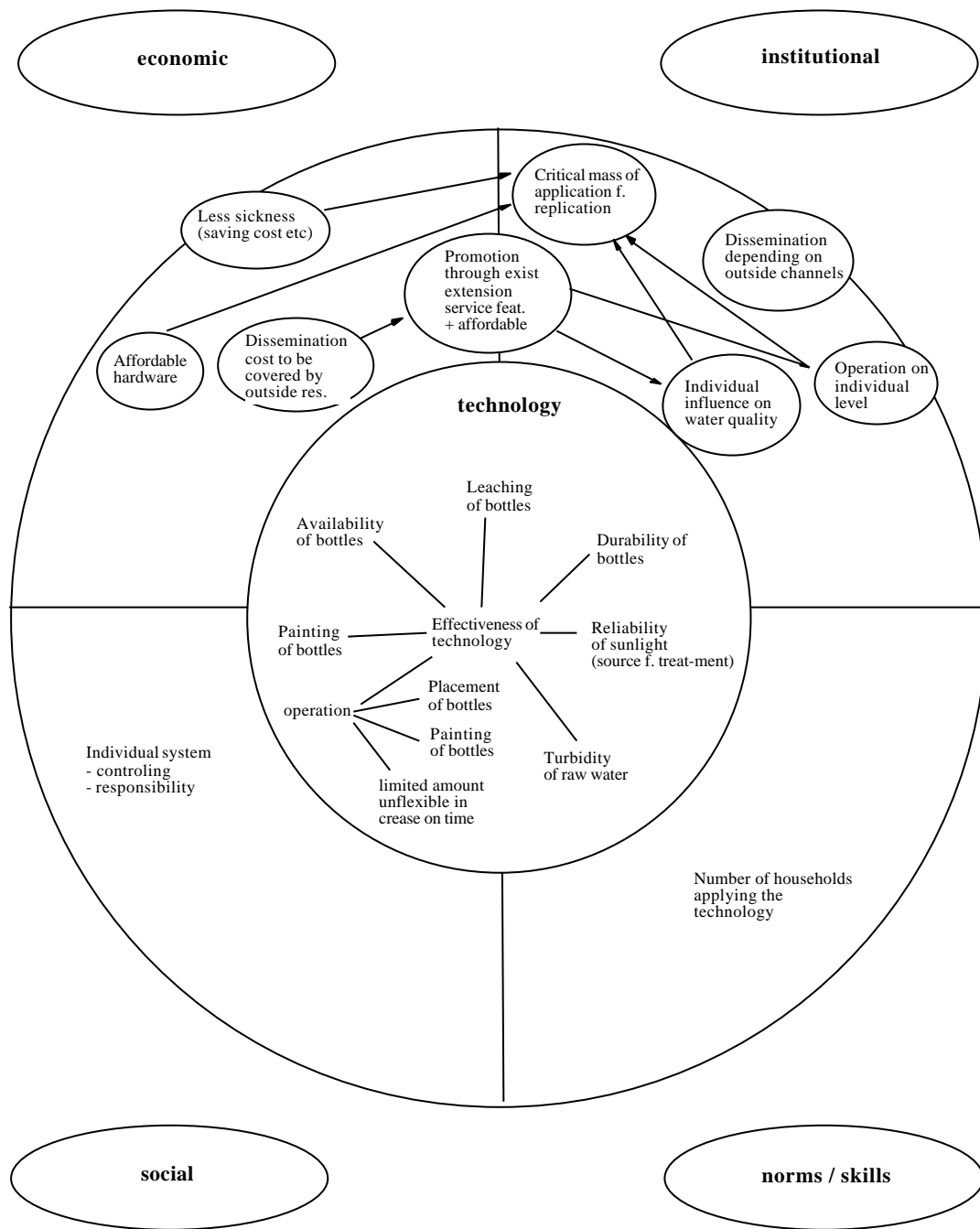


Figure 10: An example of collected and sorted issues for the SODIS case

2.3 Group work on indicators and data collection

After a second input of Urs Geiser about the process how to identify indicators and how to collect data about the indicators the working groups were requested:

- to prioritise the found issues in the three fields
- to select one issue from each field (at least one easy one)
- to define/identify "meaningful" indicators
- to answer how to collect data about the found indicators
- to proceed with the next issue as far as possible.

Which is the issue?	What is the indicator?	What is the information you get?	How do you collect the data?
Availability of bottles	Number of shops selling bottles Number of drinks sold in appropriate bottles Number of appropriate bottles per household	Direct indicator	Market survey
Critical mass of application versus achieved replication taking place	Painted bottles available on market		
	Coverage (%) of households applying the technology		Random survey
Affordability of unit price	Ratio between cost per bottle and staple food unit <1	Relative cost of bottle	Market observation

Figure 11: An example of identified indicators for the SODIS case

3. THE SIX CASE STUDIES

3.1 Working Procedure

Group work on one of the six cases For exercising the presented methods the participants were requested to join one of the six working groups dealing with a specific case and technology according to the personal interest.

Within the working group the same procedure as presented in the show case SODIS had to be applied:

1. The respective resource person exposes his case to the members of his working group.
2. The audience may ask questions to understand the case.
3. The working group then selects one technological aspect of the study case for which issues shall be identified.
4. Subsequently, the technological, economic and institutional issues that support or hinder the sustained use of the chosen technology are identified.
5. The results shall be arranged and presented in a manner that they can be used at the "market" on the last day of the workshop.
6. The chosen technology should stand out prominently.

During the working sessions the two subject specialists Urs Geiser and Erfried Neubauer visited the six groups, answered questions or provided methodical hints.

Intermediate exchange of findings

After a first working session in the group and a reminder about the tools the case and first findings had to be presented to the members of another working group. The presentation had to include the following topics:

- the chosen technology
- the reason for this choice
- the identified issues
- questions or inputs of visitors.

Market Presentation

On Friday the six groups had to present their case on four posters at a "market place" in the converted plenary room. After a short advertisement at the market, time was given for a free exchange of ideas and opinions among the participants. For this purpose one person of each group was posted at the own "market stand" to promote the results and answer questions to visitors.

Appraisal

To finalise the last working session the participants had the opportunity to vote for the most attractive market presentation and the most ingenious indicator.

3.2 Brief description of the cases and results

*Indian Handpump,
India*

Arun K. Mudgal presented the case of the Indian handpump Mark II.

Issues

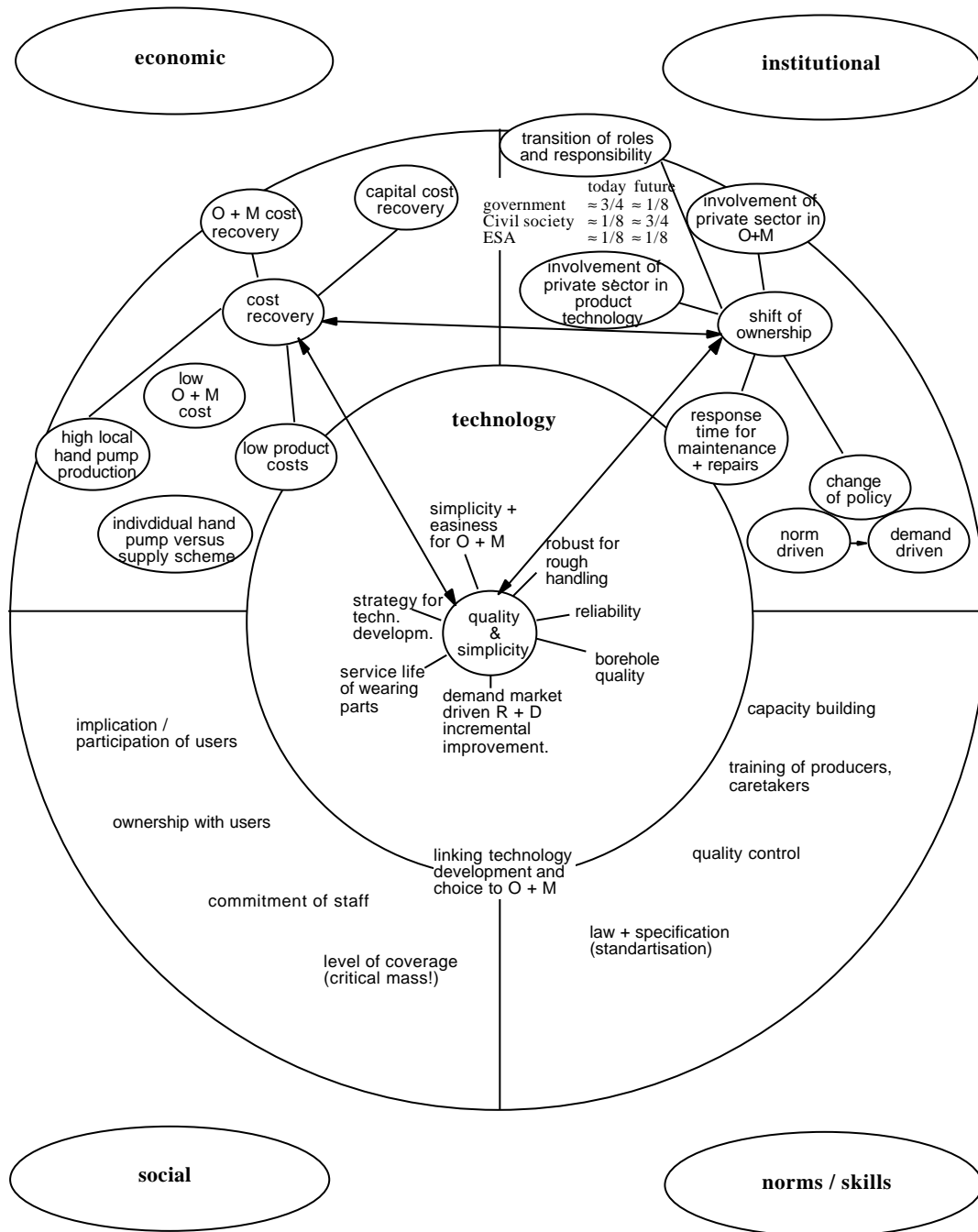


Figure 12: Identified Issues for the Indian Mark II handpump programme

Identified indicators

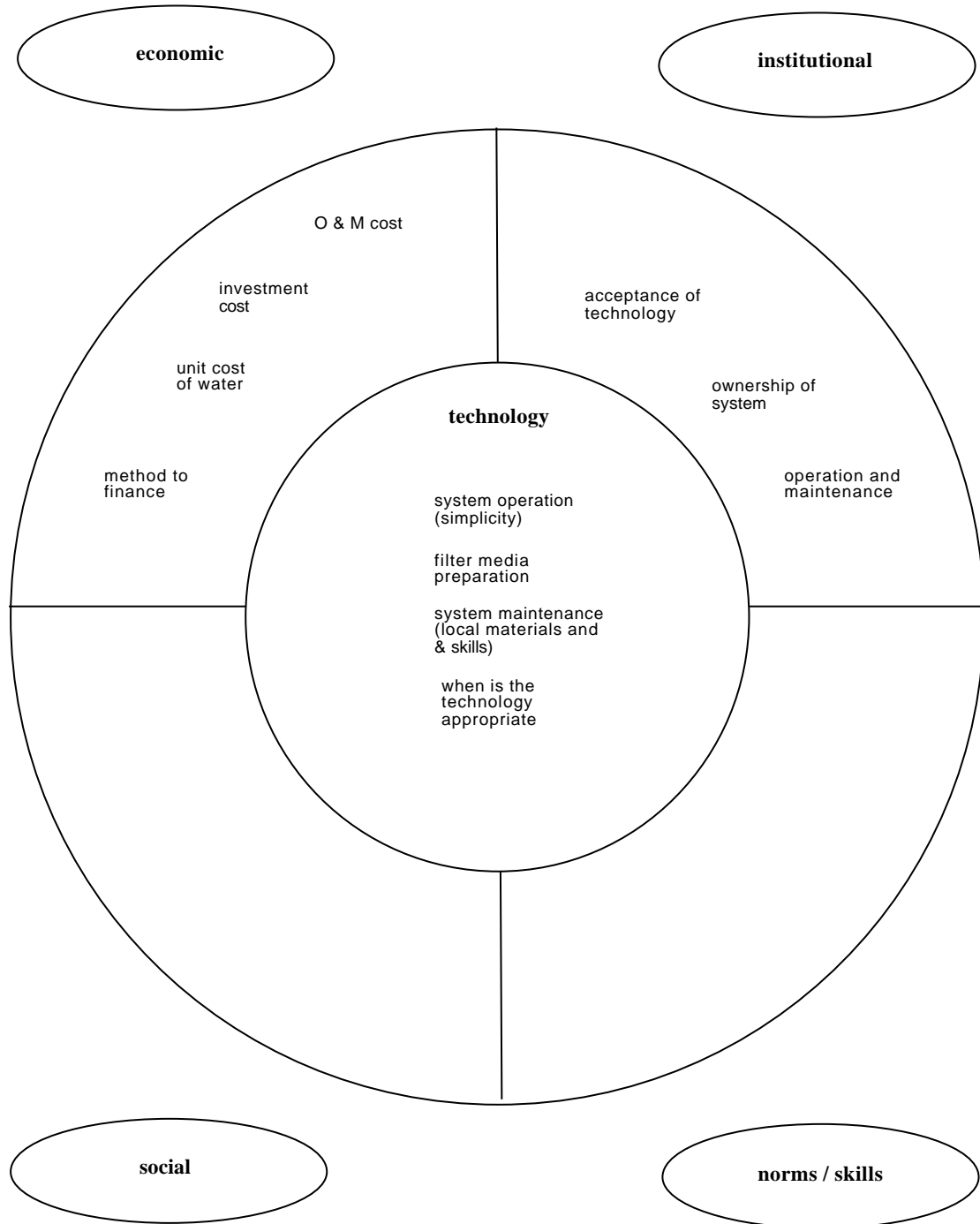
Which is the issue?	What is the indicator?	What is the information you get?	How do you collect the data?
Quality and simplicity	Robust for rough handling Reliability Ease of maintenance Service life of wearing parts	Number of breakdowns due to rough handling and vandalism Number. of replacement spare parts used ↓ % of breakdown time ↑ Maintenance and repairs done by villages Lifespan of wearing parts	Number of cases reported Random observation of breakdown time Register of number of spare parts used
Shift of ownership	Change policy Norm demand Driven driven Clarification of roles Transition of roles	Transition plan / programmes in place Roles known and implemented by stakeholders Number of spare parts bought by users Number of physical transfers of ownership agreed upon by the Panchayat	Policy documents Existing rules and regulations Interviews Statistical data collection
Cost recovery	O + M cost recovery Collection of replacement funds	Amount collected and spent per annum and capita 1/2 \$ collected per person & year	Panchayat records Panchayat & bank records

Table 1: Indicators for the Indian Mark II handpump programme

Slow Sand Filtration, The case was presented by Mesfin Shenkut
Ethiopia

Issues

Figure 5



: Identified Issues for slow sand filtration in Ethiopia

Indicators

Which is the issue?	What is the indicator?	What is the information you get?	How do you collect the data?
Systems operation (simplicity and reliability)	Amount of water produced (m ³ /day) Turbidity (NTU) Coliform count (MPN/100ml) Down time hours as % Number of visits by engineer at request of operator		Technicians - daily - plant records Requests received by engineer
Acceptance of technology	% NGW systems adopting the technology % of systems with this technology that are functioning		Annual water bureau reports
O & M cost	O & M cost per m ³		Annual expense/ production records water bureau

Table 2: Indicators for the slow sand filtration in Ethiopia

*Sanitation
Programme, South
Africa*

The case was presented by Richard Holden

Issues

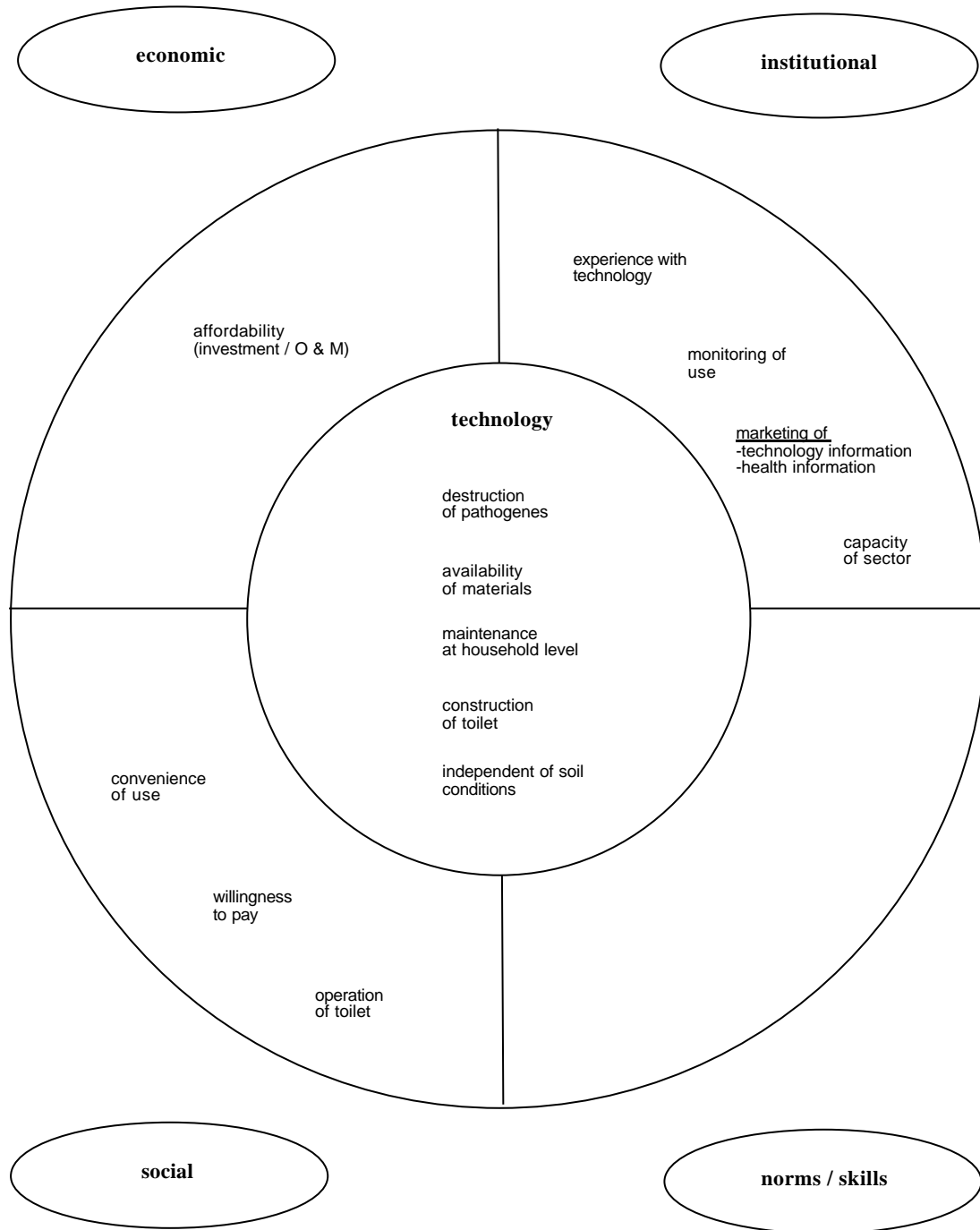


Figure 14: Issues on the Urine Diversion Toilet in South Africa

Indicators




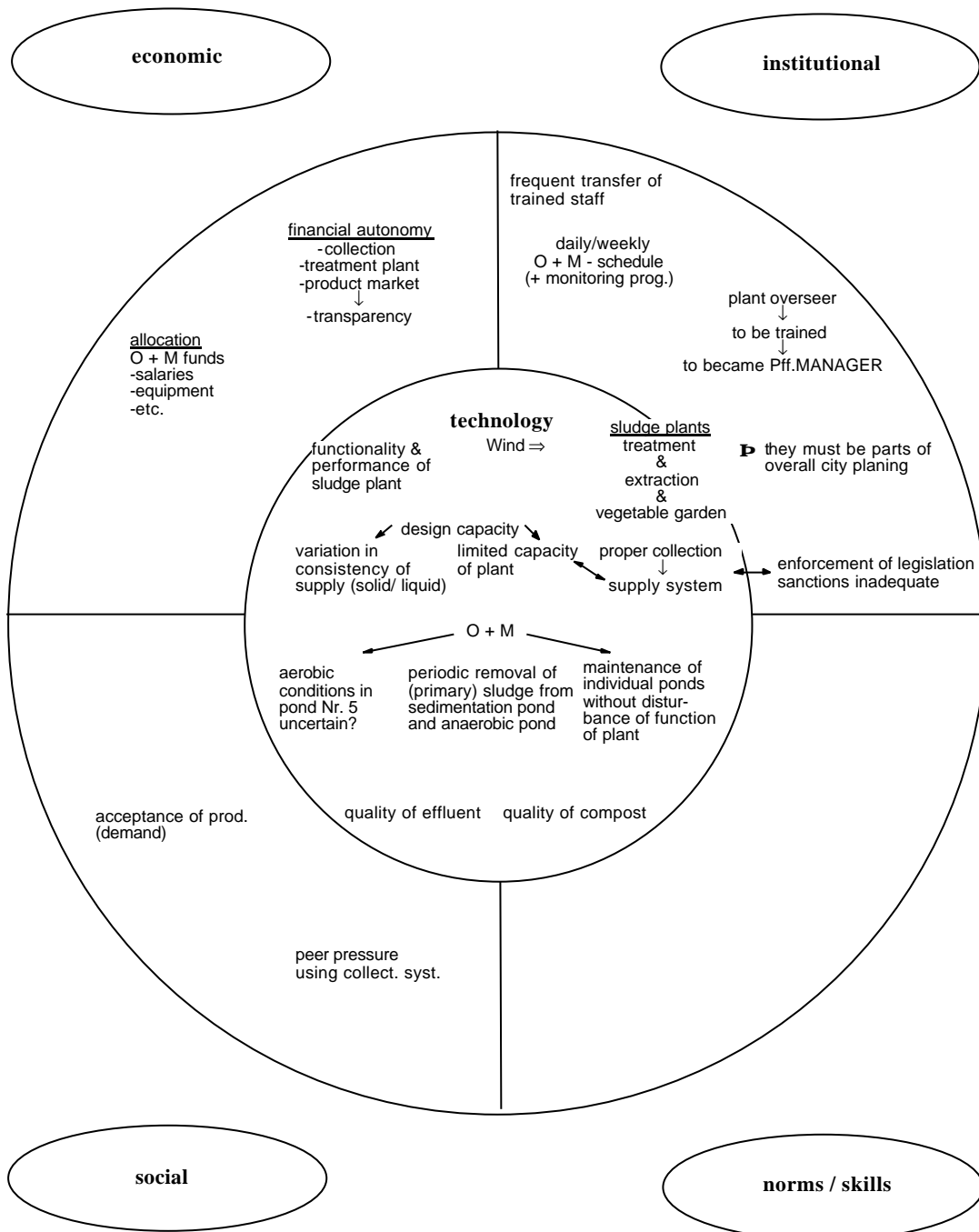
Which is the issue?	What is the indicator?	What is the information you get?	How do you collect the data?
Destruction of pathogens - Structure of toilet - Correct faeces management	Collection chamber exposed to sunlight Separation of vintage in two areas No mixing of present years vintage with previous		 Observation Observation
Affordability (capital investment O+ M costs)	Living standard - House/furniture - Car - Clothes Increasing number of toilets		Survey Observation
Capacity of sector: - Policy - Leadership - Coordination - Competence - Motivation - Financial resources - Number of staff - Quality of staff	% of national budget for programme Matching of policy and political statements Appearance of topic in media Existence of policies		 check  media analysis

Table 3: Indicators for the Urine Diversion Toilet in South Africa

*Sludge Treatment,
Ghana*

The case was presented by Annoh Collins



Issues

Figure 15: Issues on Faecal Sludge Treatment in Ghana

Indicators

Which is the issue?	What is the indicator?	Calibration (limits)	How do you collect the data?
Quality of effluent	BOD level (mgO ₂ /l)	50 mg oz/l	Sample and laboratory tests once/month by a professional laboratory
Quality of compost	Faecal coliforms count (CFU/100ml)	1000 FCU/100 ml	Observation = dead or alive by plant staff
	Ammonia (mgNH ₃ /l)	<200 mg/l	Weekly measurement by plant staff
	Dissolved oxygen (mg O ₂ /l) with testfish	>4	
	Temperature in the windrows	≥5° °C	Sample and laboratory test, once/month by a professional laboratory
	Number of pathogenic worm eggs in one gram TS	≤3-8/1gramTS	Sample and laboratory test once a quarter of a year by a professional laboratory
	Ratio carbon/nitrogen (C/N)	C/N = 15	
Funds for O + M	Amount \$ allocated by AMA for O & M of sludge plant (per year) Total amount spent for O & M of sludge plant per year/monthly amount	40'000 \$	City – AMA treasury records once /year by plant manager Financial expenditure statements from AMA once/month by plant manager
O + M Monitoring	Task lists Daily/weekly/monthly actions ↓ Reporting on tasks (form)	Short Complete Clear Relevant Complete Objective Short	↓ Plant manager coordinates and combines

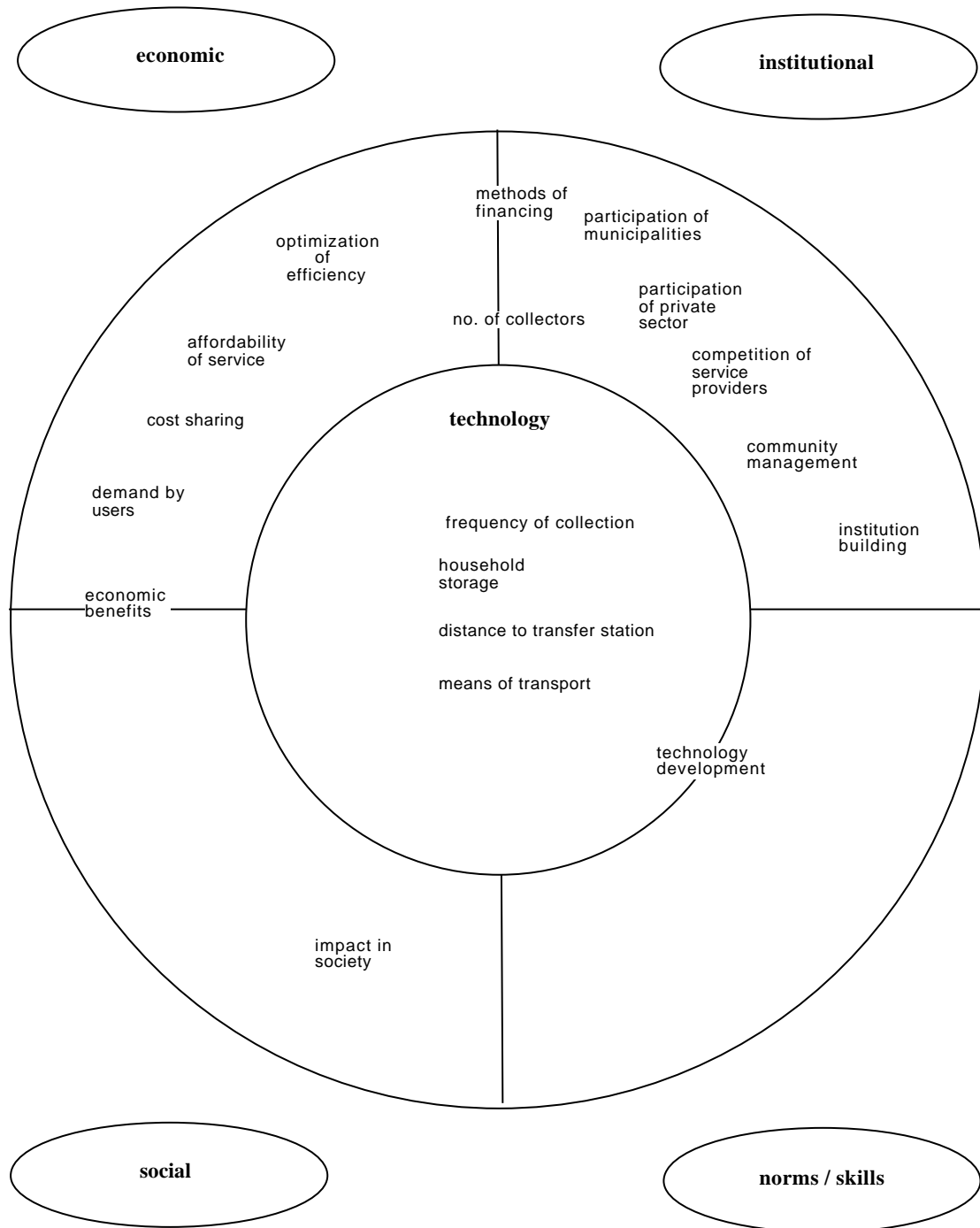
Table 4: Indicators for the faecal sludge treatment in Ghana

*Community solid
waste management*

The case was presented by Ousseynou Guène

Issues

Figure 6



: **Issues on solid waste management in Ouagadougou, Burkina Faso**

Indicators

Which is the issue?	What is the indicator?	What is the information you get?	How do you collect the data?
Means of transport Level of skill of operators	Downtime of equipment per year Capacity serviced per time Amount of external services required Time required for training	Availability of raw material and skill Number of accidents per time Bills of external service	Market survey (Weekly check) logbook Training reports
Optimisation of efficiency	Investment cost per user per year Operation cost per user per year Degree of user participation	% of self financing Maintenance cost per user per year % of coverage Rate of replication	Financial reports Household survey Total amount of subscribers over time
Participation of municipality	Existing secondary collection Communication and coordination intensity between the actors	Number of transfer stations legalised Number of unpaid loads leaving the transfer station Number of meetings per time	Municipal solid waste management reports survey Transfer station logbook NGO annual report

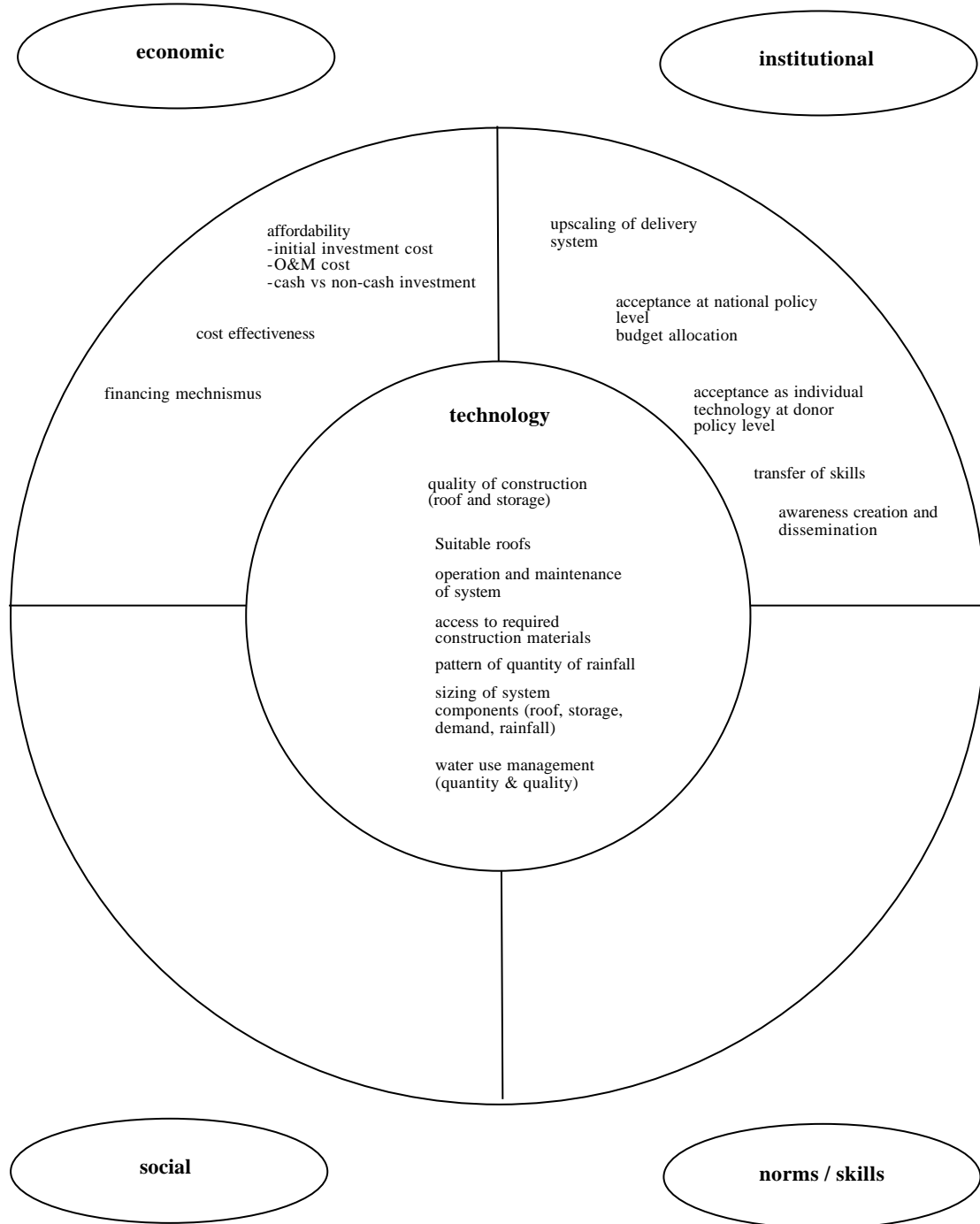
Table 5: Indicators of solid waste management in Ouagadougou, Burkina Faso

***Rainwater
Harvesting, Kenya***

The case was presented by Patrick N. Nginya

Issues

Figure 7



: Identified Issues on rain water harvesting in Kenya

Indicators

Which is the issue?	What is the indicator?	What is the information you get?	How do you collect the data?
Access to required construction materials	Construction materials at required quality and acceptable cost available in the area?		Survey with suppliers, local masons / site surveys and appropriate tests
Affordability - Initial investment - O & M cost - Cash vs. Non-cash investment	<ul style="list-style-type: none"> - Cost of system compared to annual family income - Do people have saving habits? - Do they have access to credit/financing mechanisms? - Is water high in the priority scale? 		Surveys, observations
Acceptance at national policy level	<ul style="list-style-type: none"> - Share of budgets allocation (compared to other technologies) - Is rain water harvesting mentioned as option in the national policy? and awareness? - Staffing patterns of concerned institutions compatible with RWH 		<ul style="list-style-type: none"> - Statistical data - National water policy - Survey
Upscaling of delivery system	<ul style="list-style-type: none"> - Is there a strong private sector - No of institutions involved in rain water harvesting 		<ul style="list-style-type: none"> - Observations - Surveys

Table 6: Indicators on rainwater harvesting in Kenya

4. REVIEW SESSION

4.1 Workshop experiences

Impressions of the participants

The choice of technology is an important part of a project or programme concept and for the achievement of a balanced development as decisive as the strategies of the other fields of the sector policy. All the participants experienced the strong relationship between the various fields.

When dealing with technologies we should be bound to look always from both the demand and supply side.

Ten years ago the project activities focussed on the transfer of a technology. Today it is more a technology management which includes an adequate and user-friendly handling in the context (social, economic etc.).

The market approach was very attractive and created an environment of competition among the working groups (-> motivation). As engineers we are not very much acquainted with marketing and selling methods. The market session made it quite obvious that selling a product or technology has much to do with the way of presentation. A serious marketing strategy allows to make well-based decisions by informed decision-makers.

In more personal statements it was expressed that courses like AGUASAN where professionals are allowed to exercise new working methods and include their personal experiences are very effective and helpful.

Impressions of the resource persons

The identification of issues was felt to be a powerful tool for the planning, design and implementation of a project. The method allows to open up the mind to see new potentials and hidden bottlenecks of the project. It is considered a useful method also to make things easier and structure the way of thinking.

All resource persons also appreciated the set-up of the workshop and how topics have been presented. The focus on technology, though having in mind the other fields, allowed to look at the project from a different angle.

4.2 Impact of the workshop

On policy level

Armon Hartmann expressed his satisfaction to see that sector policy perfectly covers the actual challenges of the water and sanitation sector and proved to be of great help for structuring a

sustainable project or programme approach. Even for the presented tool of identifying issues the SDC Sector Policy holds an appropriate framework. He also mentioned that in addition to the five strategies we should not forget the global ecological, socio-cultural and political aspects. Only if all these fields of the sector policy are considered as a whole we may succeed with the challenges of the sector, leading to sustainable installations.

Methodical feedback Urs Geiser and Erfried Neubauer stressed the importance of the iteration and refinement process in the cycle of identifying issues and indicators (refer to Fig. 2 in Part A).

It has to be realised that spot indicators don't serve the purpose. Indicators normally have to be taken on a regular base. The challenges of the presented method are:

- to make the indicators as precise and quantifiable as possible,
- to include the requirements for the observation and interpretation of the indicators,
- to include the time needed to correct a mistake observed through indicators,
- to calibrate indicators in order to make them comparable.

On personal work Some statements on the question "Which workshop experience can be implemented in my personal work?" are listed below:

- Use of the refinement cycle on planned project activities and probably redefine some;
- Put two stickers in my bureau: "What is the issue?" and "What are the indicators?";
- Introduce the sector policy in a new light;
- Make things simpler in order to get them across to the customers;
- Inform municipality about identified issues;
- Use and apply the learnt marketing model;
- Present things in a course as learnt in this workshop;
- Include SODIS as an option for safe drinking water supply;
- Include the experiences of the workshop in the preparation of project designs;
- Convey the introduced method to the colleagues.

4.3 Topics for the AGUASAN workshop 1999

As already stated earlier the participants were requested to propose topics of the next workshop. A list of the proposals is given in chapter 3 of the Annex. The private sector and the consideration of semi-urban dimensions can be identified as focal areas of interest.

5. SIDE ACTIVITIES

5.1 Excursion to Kastanienbaum

On June 24, 1998 the members of the workshop travelled from Vitznau to Kehrsiten by boat. After lunch at Hotel Baumgarten in Kehrsiten two boats of the Research Centre for Limnology of EAWAG brought the participants to Kastanienbaum, the location of the research centre. After a visit of the laboratory compound Dr. J. Bloesch reported on the activities of the limnological research centre and highlighted some aspects of the natural water cycle and environmental protection in the basin of Lake Lucerne.

In a second part Dr. H. J. Meng presented some issues on Swiss fishery, its economy and the development of the fish population in Lake Lucerne. Results of studies showed that due to the change of water quality and the nutrient content today's fish are smaller than fish of the same age of earlier years.

After the visit of the institute a bus brought the group to Lucerne where the famous Kappel-Bridge was visited. At around six o'clock the group returned to Rotschuo.

5.2 Humorous daily reviews

It is a tradition of the AGUASAN workshop that every morning a voluntary group of participants humorously reflects the work of the previous day. Albert Bürgi who always acts as a choreographer in the background can take for granted that the daily reviews provoked a lot of thoughts and contributed to the good atmosphere during the workshop.

*A song on
AGUASAN*

- We have been here in AGUASAN
- 't was very nice with lots of fun
- We 're all part of this great clan
- AGUASAN is now our life slogan

6. CLOSURE OF THE WORKSHOP

6.1 Closing words

Karl Wehrle briefly described his personal experience of this year's AGUASAN workshop. He remarked that the concept of "Let things develop in a relaxed atmosphere" is the driving force for creativity and ingenious solutions. He further stated that no group friction occurred and the feedbacks were given in a friendly and constructive manner.

On the technical side he requested the participants

- to recognise the technology as a major factor for the achievement of a balanced development;
- to keep an eye on the demand side (user friendliness, feedback); and
- not to forget the environmental and contextual conditions.

He ended his remarks with thanks to SDC for the technical and financial support, to the resource persons (E. Neubauer and U. Geiser) who ideally prepared and presented the cases, Tonino Zellweger for the professional moderation, to the actors and Albert Bürgi for the daily reviews, to the workshop preparation team, Maria Rätzer and Franz Gähwiler for the logistic and administrative organisation and last but not least to all the participants who contributed their knowledge and experience.

6.2 Distribution of Certificates

Armon Hartmann and Karl Wehrle could hand out the certificates of attendance to the participants with the certainty that all had appreciated and enjoyed the five workshop days.

PART C: ANNEXES

1. LIST OF PARTICIPANTS

AGUASAN WORKSHOP 14/98 Technology and Balanced Development
LIST OF PARTICIPANTS

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Other Support Services:

- Accommodation: Hotel Rotschuo, Gersau
- EAWAG Research Centre, Kastanienbaum: Mr. H.J. Meng and Mr. J. Bloesch

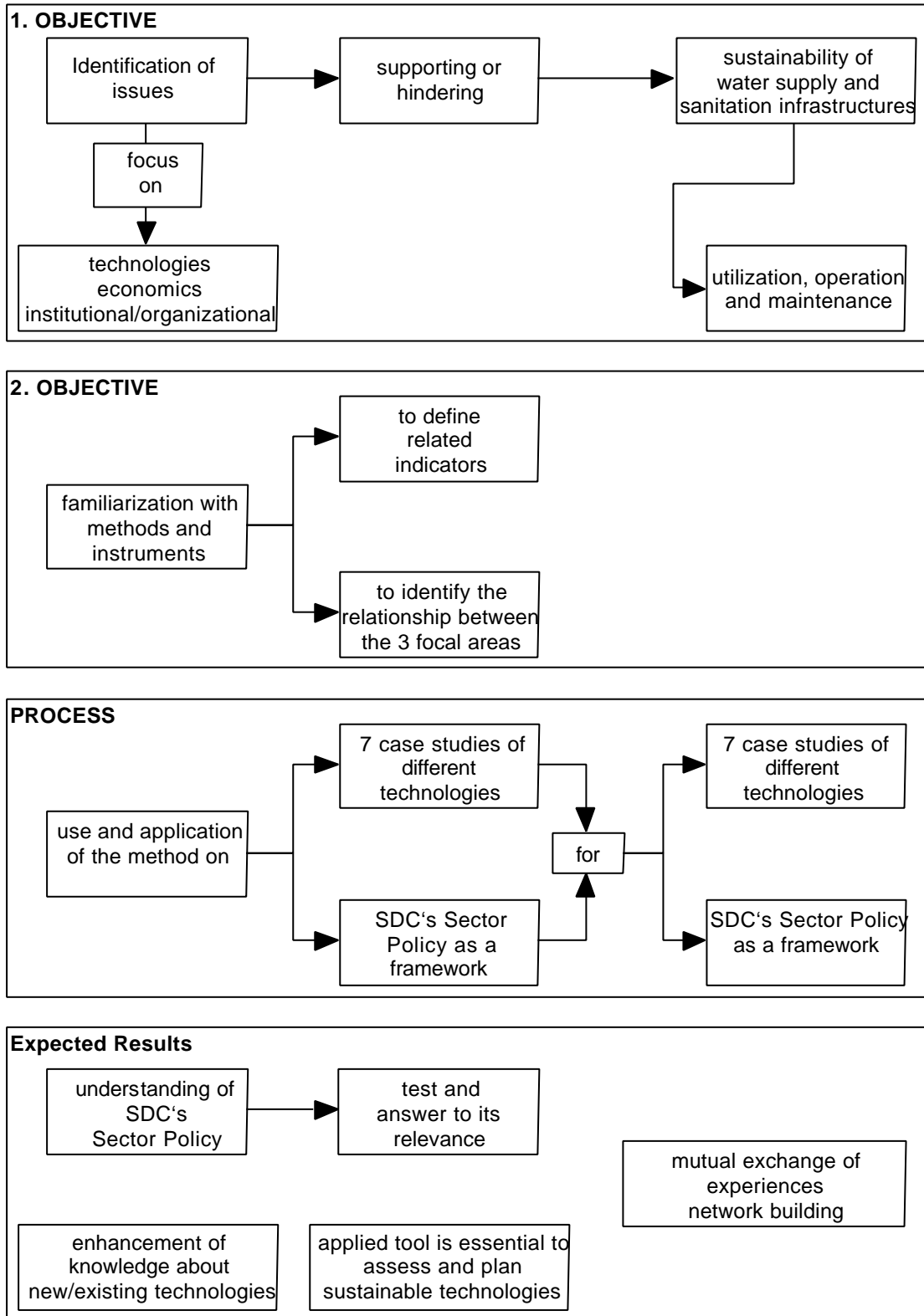
2. DETAILS OF THE WORKSHOP

2.1 History and Objectives of previous AGUASAN workshops

Year	Content of previous AGUASAN Workshops	Thematic field
1984	Appropriate Technologies in Water Supply and Sanitation	technical
1985	Water Decade	policy
1986	Participation and Animation	social
1987	Sanitation and Health	sanitation/technical education
1988	Operation and Maintenance	institutional/economic
1989	Monitoring and Evaluation	methodology
1990	Sustainability of Drinking Water Supply and Sanitation Projects	holistic view
1991	Communication in Development Cooperation	social/methodology
1992	Water and Sanitation Knowledge System	skill and know-how
1993	Water is not a free resource (anymore) - Who pays?	economy
1994	Sustainable Water Supply and Sanitation Projects through fair negotiations	institutional/social
1995	Urban Sanitation: A Challenge for Communities, Private Enterprises, Local Governments and External Support Agencies	institutional /economy
1996	Transfer of Ownership in Water Supply and Sanitation Systems	social/institutional
1997	Less Water for More People	institutional/economic /social

Reports (starting from 1988) are available at SKAT in German; Summaries in English and French; 1995 onwards all in English.

2.2 Chart of objectives



3. Topics for the AGUASAN workshop 1999

3.1 Strategy, approach, policy

- Combined programme approach in the field of water supply and sanitation
- Social, skill and knowledge approach
- Integration of water supply, sanitation and health as a must-approach
- Technology as a mean for sustainable development
- Commercialisation of development work
- The urban challenge
- Entering urban dimensions (in the fields of water supply, sanitation and solid waste)
- The transition from supply to demand
- Institutional development in a decentralised environment

3.2 Programme or project issues

- Marketing and economic management
- The private sector in water supply and sanitation
- Public/private partnership options
- Public/private partnership in water supply, sanitation and solid waste management
- Marketing and dissemination
- Marketing: water supply and sanitation options
- Gender issues

3.3 Impact

- Impact monitoring
- Risk management - quality control management
- Interlinkage between water supply and sanitation projects and the ecological environment
- Water resource management
- Water supply and sanitation in the context of natural resource management
- People-centred planning and monitoring methods/instruments
- Feedback on the implementation of the topics of the 98-workshop