

ICID'S TASK FORCE REPORT

Benchmarking of Irrigation and Drainage Projects

September 2004



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**INTERNATIONAL COMMISSION ON IRRIGATION AND DRAINAGE
New Delhi, India**

BENCHMARKING OF IRRIGATION AND DRAINAGE PROJECTS

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List of Abbreviations

AFEID	French National Committee on Irrigation and Drainage
ANCID	Australian National Committee on Irrigation and Drainage
CDPU	Central Data Processing Unit
CEYRD	Spanish National Committee on Irrigation and Drainage
CNCID	Chinese National Committee on Irrigation and Drainage
DFID	Department for International Development
DID	Department of Irrigation and Drainage
FAO	Food and Agricultural Organisation of the United Nations
I&D	Irrigation and Drainage
ICID	International Commission on Irrigation and Drainage
IEC	International Executive Council
IPTRID	International Programme for Technology and Research in Irrigation and Drainage
ISO	International Standards Organisation
IWMI	International Water Management Institute
MCM	Million Cubic Meter
MOM	Management, Operation and Maintenance
MXCID	Mexican National Committee on Irrigation and Drainage
NCIRD	National Centre for Irrigation and Drainage Development
OIBS	On-line Irrigation Benchmarking Service
PANCID	Pakistan National Committee on Irrigation and Drainage
SLNICID	Sri Lankan National Committee on Irrigation and Drainage
USCID	United States Committee on Irrigation and Drainage
WANA	West Asia and North Africa
WB	The World Bank

Foreword

Benchmarking of Irrigation and Drainage Schemes is a joint international initiative of the World Bank, International Program for Technology and Research in Irrigation and Drainage (IPTRID), International Commission on Irrigation and Drainage (ICID), International Water Management Institute (IWMI), and the Food and Agricultural Organisation (FAO). The overall aim of benchmarking is to improve the performance of an irrigation scheme/ organisation by measuring its performance against its own mission and objectives as also of different irrigation schemes against one another within the same region, country or across countries.

As approved at the ICID's 51st meeting of the International Executive Council (IEC), held at Cape Town in October 2000, five Task Forces were constituted essentially to provide ICID inputs to 3rd World Water Forum. Each Task Force dealt with a specific issue. The Task Force on "Benchmarking of Irrigation and Drainage Projects" was constituted to promote the benchmarking programme in ICID member countries with a particular emphasis on key irrigation countries. The Task Force was chaired by Prof. Hector Malano, Vice President Hon., with membership from Thailand, France, Netherlands, USA, and UK. The Task Force held its meetings as well as workshops at annual meetings of IEC held at Cape Town (2000), Seoul (2001), Montreal (2002), Montpellier (2003), and Moscow (2004). Within ICID, twelve member countries - through their respective National Committees viz., Morocco (ANAFID), Australia (ANCID), China (CNCID), France (AFEID), India (INCID), Iran (IRNCID), Malaysia (MANCID), Mexico (MXCID), Pakistan (PANCID), Spain (CEYRD), Sri Lanka (SLNICID), and USA (USCID) were selected covering a wide variety of irrigation services for the benchmarking.

The ANCID pioneered the launching of benchmarking programme and brought out its first benchmarking report for 1997/98. It has published six benchmarking reports, so far. In India, Maharashtra State has

embarked the benchmarking programme on a large scale and has included benchmarking as one of the integral activities of its Irrigation Department's Annual Review.

The Task Force provided a draft report after detailed deliberations which was presented at the 3rd World Water Forum held in March 2003 at Kyoto. The Task Force concluded its work at the 55th meeting of the IEC held at Moscow in September 2004. The papers presented and outcome of the annual workshops are available on ICID website also. A special issue on Benchmarking in the Irrigation and Drainage Sector' of the ICID Journal 'Irrigation and Drainage' (53.2) was published in June 2004.

The present report is a comprehensive overview of the processes involved in benchmarking, step-by-step. It also covers the status of implementation of benchmarking in some selected ICID member countries, and the future role of benchmarking in improving irrigation performance. A brief on IWMI's Online Irrigation Benchmarking Service (OIBS) is also included. ICID intends to promote this important activity through its Working Group on Development and Management of Irrigation Systems (WG-DMIS), from the stage at which was left by the Task Force, wound up in September 2004.

I would like to express my sincere thanks to Prof. Hector Malano for leading the Task Force and preparing this comprehensive report. Thanks are due to each and every members of the Task Force for their valuable inputs and contribution. I am grateful to Mr. Ian Makin, IWMI for reviewing and updating the draft report and also for his initiative in hosting the OIBS. Comments, suggestions made by some professionals for improving the contents of the report are gratefully acknowledged. At the Central Office, Dr. S.A. Kulkarni co-ordinated the work of Task Force since its inception and deserves appreciation. It is hoped that the report will be of interest to water resource/ irrigation managers, engineers, planners and policy makers, and researchers.

M. Gopalakrishnan
Secretary General

Preamble

An international initiative on benchmarking in the irrigation and drainage sector began in the year 2000. Initially coordinated by IPTRID, this is a joint initiative of the WB, IPTRID, IWMI, ICID and FAO. The initiative was launched at a workshop held in Rome, in August 2000 in which the principles and objectives of benchmarking were discussed. As a result, a set of guidelines for benchmarking were prepared and widely disseminated (Malano & Burton, 2001). Subsequently, ICID set up a Task Force "Benchmarking of Irrigation and Drainage Projects" at the 51st IEC held in October 2000 at Cape Town. The Task Force was chaired by Prof. Hector Malano, Vice President, ICID and has six members from different countries. Twelve National Committees viz. ANCID (Australia), CNCID (China), AFEID (France), INCID (India), IRNCID (Iran), MANCID (Malaysia), Mexico (MXCID), Morocco (ANAFID), PANCID (Pakistan), CEYRD (Spain), SLNICID (Sri Lanka), and USCID (USA) were selected for implementation of the programme.

The ICID, through its Task Force has played an important disseminating role by holding meetings/ workshops at its annual IEC in Cape Town (October 2000), Seoul (September 2001) Montreal (July 2002), Montpellier (September 2003) and Moscow (September 2004).

A dedicated website called On-line Irrigation Benchmarking Service (OIBS) has been established on the IWMI website <<http://www.iwmi.org>> to disseminate benchmarking information. National workshops were held in Mexico and India in 2001. A set of simple, universally applicable performance indicators were identified and are being field-tested. The guidelines and indicators are being tested in a number of countries. Data required for calculation of the benchmarking indicators can be entered on the website, processed and compared with data for similar schemes.

Benchmarking of Irrigation and Drainage Projects

1. Introduction

Benchmarking is about improving the performance of organisational processes, using experience gained from the study of similar organisations or processes. It is about identifying the gap between current and achievable performance and making changes to realize the higher standards of performance.

The need for higher levels of performance on irrigation and drainage systems is driven by several factors:

- Increasing population leading to a need for greater agricultural production
- Growing water scarcity within river basins leading to a need for irrigated agriculture to produce “more crop per drop”
- Higher expectations from farmers and their families in terms of their livelihoods
- Higher expectations by irrigated farmers in relation to the level of service required from the irrigation agency
- Changing perceptions, attitudes and practices within government on provision of public services
- Changing perceptions within the wider society in many countries of the role and standard of government service provision.

These and other drivers are creating a climate for change in many countries, providing a significant opportunity for implementing performance-enhancing changes that have been identified through the process of benchmarking. Once the benchmarking performance indicators have been identified and used to identify the performance gaps they then serve as the basis for monitoring the improving performance over time.

Benchmarking can be defined as (Malano & Burton, 2001):

“A systematic process for securing continual improvement through comparison with relevant

and achievable internal or external norms and standards”

The overall aim of benchmarking is to improve the performance of an organisation as measured against its mission and objectives. Benchmarking implies comparison – either internally with previous performance and desired future targets, or externally against similar organisations, or organisations performing similar functions. Benchmarking is in use in both the public and private sector.

Benchmarking originated in the corporate business sector as a means for companies to gauge, and subsequently improve, their performance relative to key competitors (Bogan and English, 1994; Miller, 1992; Camp, 1989; Wild, 1999). By studying key competitors’ outputs, and the processes used to achieve those outputs, many organisations have been able to adopt best management practices and enhance their own performance. In some cases organisations have done so well that they have, in turn, become the organisation that others use as a benchmark.

Benchmarking can be carried out by a variety of organisations, including:

- Private companies
- Government organisations
- Regulatory/supervisory organisations
- Management consultants
- Independent agencies.

A private company will benchmark its performance against other key competitors; a government agency might benchmark different units within its control, such as hospitals or schools. A regulatory/supervisory authority (such as a government regulatory body) would use benchmarking to evaluate the performance of a number of separate entities (such as Water Users Associations).

Regulatory agencies increasingly rely on benchmarking to establish pricing policies based on achieving maximum efficiency for services provided by service utilities such as gas, rail, power and water.

Benchmarking the activities and processes of the irrigation and drainage organisation can provide valuable insight on how well the organisation is performing in all areas of service delivery and resource utilisation; and become an important element of the organisation's accountability to its shareholders.

In principle, the performance of any organisation can be benchmarked. Public sector organisations are no exception. Despite the fact that benchmarking in public sector organisations is a more recent practice, it has been occurring in Government organisations without being recognised as such especially in the health sector, power sector and more recently in the urban water supply sector.

A survey of 82 irrigation and drainage organisations in 23 countries (Lee, 2000) found that 73 organisations classified themselves as public or semi-public agencies. Thus benchmarking of irrigation and drainage organisations must deal primarily with public sector organisations.

There are many reasons why organisations may be interested in the benchmarking activity. The private sector is primarily driven by a desire to improve return on investment or return to shareholders, in the public sector the aim is to improve the level and cost-effectiveness of service provision. As outlined in the Introduction service providers in the irrigation and drainage sector are responding to a variety of "drivers", including:

- Increasing competition for water, both within the irrigated agriculture sector, and from other sectors
- Increasing demand on the irrigation sector to produce more food for growing populations. Coupled with the pressure on available water resources, this results in the "more crop per drop" initiative promoted by international agencies such as the International Water Management Institute (IWMI) and the Food and Agriculture Organisation (FAO) of the United Nations
- Growing pressure to effect cost savings whilst increasing the productivity and efficiency of resource use
- Turnover and privatisation of irrigation and drainage schemes to water users, leading to more

transparent and accountable (to users) management practices

- Increasing interest by the wider community in productive and efficient water resource use and the protection of aquatic environments
- Increasing need for accountability to both government and water users in respect of water resource use and price paid for water

Different drivers will apply in different situations depending on the organisation's external environment, it is important at the outset of a benchmarking programme to identify the key drivers that are forcing change within the irrigation and drainage sector.

Benchmarking is about change, moving from one position to a better position. It is important that:

- The change process is fully integrated within the organisation's management processes and procedures.
- Those responsible within the organisation for the benchmarking programme have the authority to bring about change;

Irrigation and drainage are essentially services to irrigated agriculture – providing and removing water to suit the crops' needs. Thus in the irrigation and drainage sector we are interested in improving the *level of service provision* to water users, thereby enabling them to maintain or increase levels of agricultural production.

In approaching benchmarking for the irrigation and drainage sector there are three characteristics that need to be borne in mind:

- Irrigation and drainage service providers operate in a natural monopoly environment
- Irrigation and drainage entails complex and interacting physical, social, economic, political, technical and environmental processes
- Performance on irrigation and drainage schemes is site specific.

Within the irrigation and drainage sector performance assessment has been a subject of study for over a decade, and much has been written on the subject

(Abernathy, 1990; Bottrall, 1981; Bos, 1997; Burt and Styles, 1999; Makin et al, 1990; Molden and Gates, 1990; Murray-Rust and Snellen, 1993; Oad and McCornick, 1989; Rao, 1993; Small and Svendsen, 1992; Smedema et al. 1996, Vincent et al. 2002, Zhi, 1989). Early work on the comparative performance of irrigation schemes, which lies at the heart of benchmarking, came from the International Water Management Institute (Perry, 1996; Molden et al, 1998; Kloezen and Garces-Restrepo, 1998). It is from this work that the indicators of performance to be used in the benchmarking process have been selected.

2. Benchmarking principles

The process of benchmarking is illustrated in **Figure 1**, with six stages: identification and planning; data collection; analysis; integration; action; and monitoring and evaluation (Malano & Burton, 2001). The six stages can be divided into two parts – Part - I Finding Out and Part II – Taking Action.

2.1 Part I – Finding out

Stage 1 Identification and planning

In Stage 1 the following are decided:

- The purpose, drivers and desired outputs of the benchmarking process
- The “customers” – both within and outside the organisation
- What areas of the organisation’s activities are to be benchmarked
- Against whom or what performance is to be benchmarked
- Indicators of performance

The planning phase, like that of many other processes, is one that will to a large extent determine the success of the benchmarking activity. The extent and specifications of data needed for benchmarking is defined at this stage. Consistency in the definition of the performance indicators used for benchmarking is

of critical importance to ensure that all the data collected are comparable.

To facilitate integration and action following the analysis phase it is important to involve key players in the benchmarking process at the outset. This reduces the resistance to change and makes use of the expertise at a variety of levels within the organisation to facilitate change.

Stage 2 Data collection

The core of any benchmarking exercise is data collection. In order to enable comparison between irrigation and drainage schemes data used for benchmarking needs to be consistent and comparable. This is a crucial aspect that requires adequate provisions during the identification and planning phase of the programme.

There are three types of data collection:

1. Data collected for day-to-day management, operation and maintenance of the irrigation and drainage systems
2. Data collected for benchmarking and comparison with other systems.
3. Data collected as part of the diagnostic process within the benchmarking exercise to identify causes of performance.

This section is primarily concerned with the data collection for the benchmarking activity. However, it must be recognised that data collected for the day-to-day operation of the system play a critical role in achieving high performance of service delivery and in helping to interpret the outcomes of the benchmarking comparison.

A key issue within the irrigation and drainage sector is the uniqueness of each irrigation and drainage scheme. There are many variables that influence the performance of irrigation and drainage schemes, making comparative performance difficult.

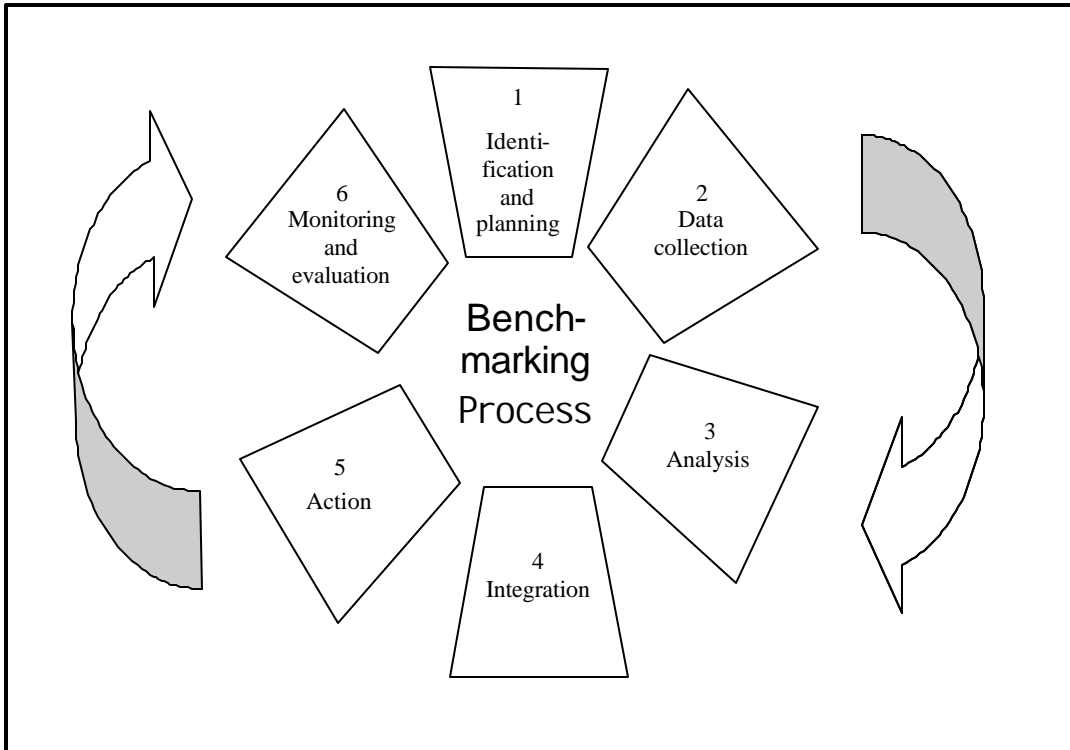


Figure 1. Stages of the Benchmarking Process

This is one of the major challenges to any benchmarking activity in this sector. Historically, management of irrigation and drainage are not always within the same organisation, although highly desirable. To be able to group similar types of system for benchmarking purposes it is necessary to collect background descriptive data on each scheme, including information of the drainage system separately. This information includes information such as the location, climate, water source, type of crops grown, irrigated area, average farm size, irrigation method, type of management, type of drainage (Table 1).

Stage 3 Analysis

The analysis stage identifies the performance gap between the organisation and the organisation(s), norms or standards with which the organisation is compared. From the analysis comes the understanding of:

- The performance gap

- The causes of the performance gap
- Actions required to close the performance gap.

Thus benchmarking is not just a comparative performance assessment exercise, it also incorporates diagnostic analysis, that is finding out about the causes of identified levels of performance. Once the causes are understood then solutions can be identified and action taken to apply the solutions. The diagnostic analysis phase of the benchmarking process can be difficult.

It is at this stage that the desired performance targets are formulated. The final target values are established during the integration stage when the feasibility of achieving these values are discussed and agreed with key stakeholders. It is important to note that these stakeholders will include all those affected by irrigated agriculture within the area, including farmers, villagers, fishers, urban dwellers, etc.

Table 1. Key Descriptors for Irrigation and Drainage Schemes

Descriptor	Possible options	Explanatory notes
Irrigable area	-	Defines whether the scheme is large, medium or small scale
Drained area*	Area with gravity drainage system Area with controlled (incl. pumped) drainage	Defines the magnitude of drainage systems that are part of the water management
Annual irrigated area	Area from surface water Area from groundwater	Shows the intensity of use and balance between surface or groundwater irrigation
Climate	Arid; semi-arid; humid; humid tropics; Mediterranean	Sets the climatic context. Important for comparison between schemes
Water resources availability	Abundant; sufficient; water short	Sets the water resources context, can be associated with climate.
Water source	Storage on river; groundwater; run-of-the river; conjunctive use of surface and groundwater.	Influences the availability and reliability of irrigation water supply
Average annual rainfall	-	Associated with climate, sets the climatic context and need for irrigation and/or drainage
Average annual reference crop potential evapotranspiration (ET _o)	-	Associated with climate, sets the climatic context and need for irrigation.
Method of water abstraction	Pumped; gravity; artesian	Influences the supply of irrigation water.
Water delivery infrastructure	Open channel; pipelines; lined; unlined	Affects the potential level of performance.
Type of water distribution	Demand; arranged on-demand; arranged; supply orientated	Affects the potential level of performance.
Type of drainage*	Gravity; controlled; pumped. Surface; subsurface (hor.); vertical	Affects the potential level of performance.
Predominant on-farm irrigation practice	Surface – furrow, basin, border, flood, furrow-in-basin; Overhead – raingun, lateral move, centre pivot; Drip/trickle Sub-surface (i.e controlled drainage)	Affects the potential level of performance.
Major crops (with percentages of total irrigated area)	-	Sets the agricultural context. Separates out rice and non-rice schemes, monoculture from mixed cropping schemes.
Average farm size	-	Important for comparison between schemes, whether they are large estates or smallholder schemes
Type of management of irrigation system	Government agency; private company; joint government agency/farmer; farmer-managed	Affects the potential level of performance.
Type of management of drainage system*	Government agency; private company; joint government agency/farmer; farmer-managed	Affects the potential level of performance.

* recently suggested and not yet included in current field testing of the benchmarking

2.2 Part II – Taking action

Stage 4 Integration

The action plan developed from the analysis phase must be integrated into the operational processes and procedures of the organisation in order to bring about the desired change. It is crucial that those responsible for benchmarking have the power within the organisation to bring about change. Benchmarking programmes often fail at this stage, leaving those involved disillusioned with the process, and with the performance of the organisation.

The process of gaining adoption of the new processes and procedures is often termed “internal marketing”, and leads to the development of a sense of ownership and support by key personnel for the benchmarking process. Training is a key element of this process.

Stage 5 Action

Once acceptance of the new processes and procedures has been gained they can be put into place to bring about the desired change.

Stage 6 Monitoring and evaluation

Monitoring and evaluation of the process is required to ensure that desired targets are being achieved, and that corrective action, where necessary, is taken in time.

The success of benchmarking is marked by the continuing measurement of the organisation’s performance against the target norms and standards established during the analysis and integration stages. These targets are, however, changing over time, and continual updating and revision of the targets is necessary to maintain best practices and relative performance.

3. Benchmarking in the Irrigation and Drainage Sector

Benchmarking has only recently been introduced into the irrigation and drainage sector. A programme has been underway in Australia initiated by the Australian National Committee of ICID since 1998

(ANCID, 2000). So far ANCID has brought out six Benchmarking Reports. The first benchmarking report for 1997/98 reported on 33 irrigation systems and used 15 performance indicators. The 1998/99 benchmarking report reported on 46 systems and used 47 performance indicators. The 2002/2003 report provides data on 66 supply systems and 69 key irrigation industry performance indicators.

Benchmarking in the irrigation and drainage sector was initially coordinated by IPTRID and is a joint initiative of the WB, IPTRID, IWMI, ICID and FAO. The initiative was launched at a workshop held in Rome, August 2000 in which the principles and objectives of benchmarking were discussed. As a result, a set of guidelines for benchmarking were prepared and widely disseminated (Malano & Burton, 2001), a dedicated website to disseminate benchmarking information was established by IWMI (IWMI, 2001), and national workshops were held in Mexico and India. Under this programme a set of simple, universally applicable performance indicators were identified and are being field tested. These guidelines and indicators are in the process of being tested in a number of countries. In addition an on-line benchmarking service has been established on the IWMI website < <http://www.iwmi.org>>. Data required for calculation of the benchmarking indicators can be entered on the website, processed and compared with data for similar schemes, referred to as the peer group of schemes.

The ICID has played an important disseminating role by holding workshops at its annual Executive Council meetings in Cape Town (2000), Seoul (2001), Montreal (2002), Montpellier (2003) and Moscow (2004).

Several countries have commenced the implementation of national benchmarking activities including Australia, Mexico, India, China, Egypt, Malaysia, Pakistan, France and Spain. Countries like France, Australia and Spain had implemented benchmarking in their irrigation and drainage sector using their own set of indicators before this initiative. In addition to the international set of indicators, most participating countries have adopted country-specific indicators to measure specific areas of performance. Following is a summary of progress and experience from some of the participating countries.

Table 2. Summary of Benchmarking Performance Indicators

Domain	Performance indicator
Service delivery performance	Total annual volume of irrigation water delivery (m ³ /year)
	Annual irrigation water delivery per unit irrigated area (m ³ /ha)
	Main system water delivery efficiency
	Annual relative water supply
	Annual relative irrigation supply
	Water delivery capacity
	Security of entitlement supply
	Total annual volume of drainage water removal (m ³ /year, m ³ /ha)*
	Total annual volume of drainage water treatment for reuse (m ³ /year, m ³ /ha)*
	Drainage ratio*
Financial	Cost recovery ratio
	Maintenance cost to revenue ratio
	Total MOM cost per unit area (US\$/ha)
	Total cost per person employed on water delivery (US\$/person)
	Revenue collection performance
	Staffing numbers per unit area (persons/ha)
	Average revenue per cubic metre of irrigation water supplied (US\$/m ³)
Productive efficiency	Total gross annual agricultural production (tonnes)
	Total annual value of agricultural production (US\$)
	Output per unit service area (US\$/ha)
	Output per unit irrigated area (US\$/ha)
	Output per unit irrigation supply (US\$/m ³)
	Output per unit water consumed (US\$/m ³)
Environmental performance	Water quality (irrigation, drainage*): Salinity (mmhos/cm)
	Water quality (irrigation, drainage*): Biological (mg/litre)
	Water quality (irrigation, drainage*): Chemical (mg/litre)
	Average depth to groundwater (m)
	Change in water table over time (m)
	Salt balance (tonnes)
* Recently suggested and not yet included in current OIBS	

Australia

Australia embarked in a benchmarking program in 1998. The program was coordinated by the Australian National Committee of ICID (ANCID) and benchmarked a number of major irrigation water service providers in the country. An increasing number of service providers joined the program since 1998 to include a total of 47 water supply systems. The systems were benchmarked using 62 indicators covering four general areas, namely:

- ◆ Operational Performance
- ◆ Financial Performance
- ◆ Environmental Performance
- ◆ Business Performance

A recent review of the program has recommended different levels of reporting including:

- General irrigation water provider statistics
- Performance reporting indicators
- Confidential internal performance benchmarking indicators.

The first two reports will become public and the third type of report will focus on business performance and will be only available to the service providers. Information in this report will not allow identification of individual water providers and their performance level.

France

In France, the French National Committee of ICID (AFEID) contributed to the Benchmarking Initiative in two-ways:

- According to the current programme, contributing to OIBS using data available from gravity irrigation systems.
- Based on current French practice in modern command areas making proposals for improvement and further extension of this programme

AFEID has obtained funds for the first type of actions in January 2003, to appoint staff in charge of assisting and interacting with managers of gravity irrigation systems to finalize data gathering and processing in the format required by the IPTRID/IWMI network. AFEID feels the initiative may be a very valuable opportunity to help managers to discuss performance indicators and management tools relevant to their main concerns.

For the second type of actions, the AFEID intends to prepare, a report about lessons drawn from the actual benchmarking practice of the regional development corporations (SARs), who manage the large irrigation schemes.

These are multipurpose systems of integrated water management, providing raw water service to their customers by means of pressurized networks. The SARs currently benchmark the quality standards (ISO 9001) of other customer services, such as domestic water supply, electricity, phone, bank, mail, etc., and their environmental management systems (ISO 14001)

Spain

The Andalusia region of Spain has commenced a benchmarking program covering 815,000 ha of irrigation in 156 irrigation districts. Irrigation in Andalusia consumes 651 MCM or water. The benchmarking program focuses on the application of Data Envelopment Analysis techniques to rank the productivity of irrigation districts based on the IPTRID performance indicators. The analysis enabled the ranking of irrigation district throughout the region grouped in three sub areas: interior with

predominantly olive trees; Atlantic with predominantly strawberry crops, and Mediterranean Littoral with predominantly greenhouse crops.

Malaysia

A key goal of the National Agriculture Policy of the Malaysian Government is to ensure that the country becomes 65% self-sufficient in rice production. Given that no significant increase in the area planted to rice is expected, this goal must be primarily achieved through an increase in land and water productivity. Benchmarking is one of the key elements of this strategy. The Malaysia program targets eight granary areas totalling some 210,000 ha in which rice production is concentrated. The Department of Irrigation and Drainage (DID) has instituted a process whereby a group of indicators largely based on the IPTRID guidelines was selected. The process also incorporates protocols and specifications for the collection and processing of data. The program was launched recently through a series of meetings, workshops and seminars aimed at dissemination benchmarking concepts and stakeholder consultation.

India

The India benchmarking program was initiated at a workshop held in Aurangabad in February 2002. The meeting identified a set of projects for initial benchmarking in the States of West Bengal, Maharashtra, Bihar, Haryana, Andhra Pradesh and Tamil Nadu. The program was to be based on a combination of IPTRID indicators and additional State-specific indicators.

The Indian State of Maharashtra initiated a benchmarking program of 8 irrigation projects of major and medium size covering an area of 460,000 ha in 2001. Fifteen performance indicators are used for benchmarking performance. Successive workshops were held at the State level to discuss and disseminate the requirements and benefits of the benchmarking program. The program has also decided to join the international benchmarking initiative and share data on the On-Line Benchmarking System.

Maharashtra has published annual reports on Benchmarking of irrigation projects in 2002-2003

and 2003-2004 seasons. The 2003-2004 report includes performance data for 49 major, 142 medium and 63 minor projects.

China

China is amongst the first country to participate in the IPTRID's benchmarking program of irrigation and drainage systems in 2000. After a period of familiarisation with the program, implementation began in two systems: The Zhange Irrigation System (ZIS) in Hubei Province, and the Liu Yuan Kou Irrigation System (LIS) in Henan Province. The two systems were chosen because of their dissimilar characteristics. The Zhanhe system was considered to be well managed and had higher water use efficiency, while in Liu Yuan Kou efficiency and the standard of management were considered to be lower.

In 2001, data from both systems were collected and forwarded to IWMI for upload to the OIBS. During this time, the benchmarking working group and local managers developed a better understanding of the indicators and objectives of the program. Activities had remained at a low level as a result of financial difficulties to fund the program.

A recent project funded by the British Government's Department for International Development (DFID), and implemented by HR Wallingford, has begun to carry out a knowledge and research (KAR) study "*Applying benchmarking as a tool for irrigation management reform*". The overall objective is to evaluate the application and utility of benchmarking as a management tool that can contribute to improved standards of service delivery to irrigators. The study forms part of a larger, international, initiative aimed at developing and introducing benchmarking in the irrigation sector as a tool to promote enhanced management practices. In China, it will be carried out under the general umbrella of the National Centre for Irrigation and Drainage Development (NCIDD) and in collaboration with other central or Provincial Chinese agencies or Universities agreed by NCIDD. Additional data (5-10 years) from over 20 schemes was currently being collected to understand how benchmarking should be used to achieve different objectives.

Workshops on Benchmarking of Irrigation and Drainage Performance were held in Central Asia

(Tashkent), India (Aurangabad), Viet Nam (Hanoi) during 2003. The Hanoi Water Resources University has used the OIBS system is one module on Irrigation Performance Improvement. "Benchmarking" is being included as on-going revisions to irrigation and drainage textbooks.

4. Future Role of Benchmarking in Improving Irrigation Performance

Benchmarking has been extensively used in the private and public sectors for many purposes. Whilst it is difficult to classify benchmarking applications, we can identify three broad areas of benchmarking applications:

- Benchmarking performance of private sector organisations
- Benchmarking performance of government organisations
- Benchmarking performance by regulatory agencies

It is telling that the origin of benchmarking in the irrigation and drainage sectors is attributed to adoption of the methodology to gauge and improve the performance of water service providers in Australia. The need to improve performance and to show compliance with the demands of the regulatory authorities gave the impetus for service providers, some making the transition from public to private sector, to seek methodologies to evaluate performance.

As the demands for greater accountability of public and private sector agencies increase, and as the pressures on available water resources become more intense, the demand for irrigation and drainage service providers to improve service provision will also increase.

Benchmarking of public sector organisations is a comparatively recent practice. It has been occurring in Government Organisations without being recognised as such especially in the health sector, power sector and more recently in the urban water supply sector. Irrigation and drainage organisations can be viewed as natural monopolies, with marked similarities to these other services, providing either local service at the district or regional level. Benchmarking is highly applicable to these

organisations with the only prerequisite being that management must embrace the goal of pursuing best management practices within a service oriented management system. Unlike private sector organisations where the main aim of benchmarking is to improve their return on investment, the main aim of benchmarking in public sector organisations is to improve the quality and cost-effectiveness of their service delivery.

There are a number of features that will distinguish the benchmarking of public sector organisations from those in the private sector. The more obvious ones are:

- That the benchmarker's political constituencies must be lined-up in support of the undertaking. Otherwise it may never get off the ground.
- That no public sector practitioner can separate the daily business of government from the political wheeling and dealing of its elected leaders. Their high rate of turnover has widespread impact. One day the champion is there; the next day he/she is out of the office.
- Perceptions of politicians and unions can create major obstacles to benchmarking and implementing best practices.

Regulatory agencies are already using benchmarking to develop pricing policies for service utilities that operate in a monopoly environment. In future we can expect a similar trend in the I&D sector. In this context, regulatory agencies will use benchmarking to compare the efficiency of service organisations and fix service prices based on those organisations which perform at the highest level.

Programs for benchmarking the performance of irrigation and drainage agencies and sector have now started in several countries. It is important to emphasise that at the agency, local or national level, benchmarking must be seen as continuous evolving practice. Benchmarking in the irrigation sector is a very recent activity. It has taken a long time for benchmarking to mature to the level it has in other sectors such as electricity, gas supply, urban water, etc. A similar evolution must be expected in the irrigation and drainage sector. It is important nevertheless to outline a road map for the future of benchmarking to ensure that it becomes an effective

tool to improve irrigation performance. Whilst the history of irrigation benchmarking is relatively short, there are several features that are common to high performance irrigation organisations, such as:

- Well developed strategic plans in which benchmarking play an important role in guiding the direction of the organisation
- Commitment to excellence in service provision
- Effective user participation in the management and operation of the system
- Effective policies for water resources and environmental management.

Benchmarking can be an effective tool to help achieve these performance objectives. It is however important to understand the adoption of benchmarking implies an on-going process of measuring, comparing and internalising best management practices identified in the process. As shown in Figure 1, it is a circular process rather than a linear process with a starting point and an end point.

To become fully effective the irrigation and drainage profession will need to adopt a standardized set of scheme descriptors and performance indicators, such as currently defined by the IPTRID guidelines. In addition, those undertaking benchmarking as part of management must have access to reliable data obtained from comparable systems. OIBS has been established to provide a common platform in which data can be shared and compatible indicators compared. The use of a common central database will provide a growing set of schemes from which to select an appropriate "peer group" and will help ensure access to agreed sets of indicators.

The special edition of the ICID Journal (Vol53.2) on Benchmarking was published during 2004 under the editorial supervision of the Task Force.

5. The On-line Irrigation Benchmarking System (OIBS)

A major aim of the benchmarking programme is to enable the partner organizations to access data and information that has been collected and processed by other system managers and that is presented in compatible format. The Central Data Processing Unit

(CDPU) has been established at IWMI to develop, host and operate an Internet based data management service for the benchmarking initiative. This service is referred to as the On-line Irrigation Benchmarking Service (OIBS) and can be accessed through the IWMI web server at <http://www.lk.iwmi.org:82/oibs/main.htm>.

CDPU enables participating organizations to access data submitted by other partners whilst the CDPU performs the role of a gatekeeper to the OIBS database in order to ensure that data used in benchmarking analyses has been subject to an acceptable level of quality control. The CDPU accepts on-line registrations to the database, issuing user access rights after initial verification of the applicant's requirements from OIBS. The CDPU reviews data submitted to the OIBS database as part of the quality control process.

There are two stages of data processing in the benchmarking programme.

Initial processing (Data Collection, Figure 1) is by participating organizations preparing summaries of basic system operating data. Essentially each partner organization processes individual scheme operational data to obtain annual summaries, generally coinciding with the fiscal year of the organization submitting the data. This data is then submitted to the OIBS database, either on-line through the OIBS web-interface, or off-line using either the off-line interface or the IPTRID spreadsheets included in the guidelines.

Second stage (Analysis, Figure 1) processing and computation of individual benchmark indicators is accomplished in response to user on-line demand to

OIBS database. Results are presented on-line in either tabular (Table 3) or graphical format (Figure 2) for the selected peer group of schemes

Computing the indicators and comparing the performance of one scheme against one or more others in the user defined peer group enables each user to select the levels of performance they wish to achieve. In order to maintain anonymity of data, individual schemes are not identified when presented through the web-interface, Table 3. Therefore, to enable scheme operators to exchange information regarding the levels of performance achieved, and the management practices that led to these achievements, the CDPU can arrange electronic introductions of the users to each other so that direct exchange of experiences can be achieved. It is envisaged that data sharing through the CDPU will subsequently encourage "one-to-one" exchange of data and information between the partner organizations.

The initial OIBS web service was initiated on schedule on 1st January 2002, with links being established from the IWMI, IPTRID and ICID web sites. Based on user feedback an updated version of the interface was developed between January and June 2002 and put on-line during June 2002. OIBS Version 2 introduced a number of refinements to the user interface and provided an On-line administration toolkit for remote maintenance of the web site.

Further improvement and "bug" fixes were made to the OIBS web site during 2003. The contribution of the DID Malaysia Benchmarking work group and Mr. Teoh Boon Pis have been very useful and are acknowledged by the Task Force.

A further upgrade to version 3 of the OIBS site will be completed during 2004 including a new Benchmarking Home page with additional resources for organizations wishing to take up benchmarking initiatives. The inclusion of new indications described above and the introduction of the division of key performance indicators for wet and dry seasons is being investigated in response to requests from users in monsoon climates.

Table 3 Example of OIBS Performance Summary table

Benchmark Tabular Output - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites Media

BenchMarking
In Irrigation and Drainage Sector

Online Irrigation Benchmarking Services

Tabular OutPut

Scheme Number	Year	Total Annual Water Delivery (ml)	Main System Water Delivery efficiency	Relative Water supply	Relative Irrigation supply	Water Delivery Capacity	System Water Right	Security of supply	Total Cost Recovery Ratio	Maintenance cost to revenue ratio	Gross agricultural production	Total Value of agricultural output (US\$)	Quality I Irrigation Salinity (mmhos/cm)	Quality I Drainage Salinity (mmhos/cm)
56	2001	30000	1.33	2.5	1.02	26.75	5200	12	13.33	2.73	819880	4.06	22500	12400
56	1999	33	1.33	0.5	0.8	0.89	33	33	1	1	113735	134512	99	88
53	1960	10	0.8	1.67	1.33	2	0	75	1	0.25	7500	2250	10	20
53	1965	12	0.5	1.5	0.75	1.43	0	75	0.75	0.33	6000	2100	10	20
18	1998	850	0.59	1.89	1.25	1.07	8	75	0	0	61500	790714	0	0
18	1987	342300	0.64	2.22	0.89	1.04	25	85	0	0	474577	0	0	0
18	1988	210220	1.05	1.36	0.89	1.04	25	85	0	0	0	0	0	0
56	1985	0	0	0	0	0	0	0	0	0	0	0	0	0
56	1987	0	0	0	0	0	0	0	0	0	0	0	0	0
69	2000	873000	1	0	2825.2	0	0	0	0.72	0.19	0	0	0	0
70	2000	253000	1	0.47	1	0	0	0	0.82	0.56	0	0	0	0
73	1994	4000	0.25	1.82	0.5	1	1	50	1	1	22000	218947	0	0

Back to Select Scheme

IPTRID WORLD BANK IWMI ICID-CID FAO CONTACTS

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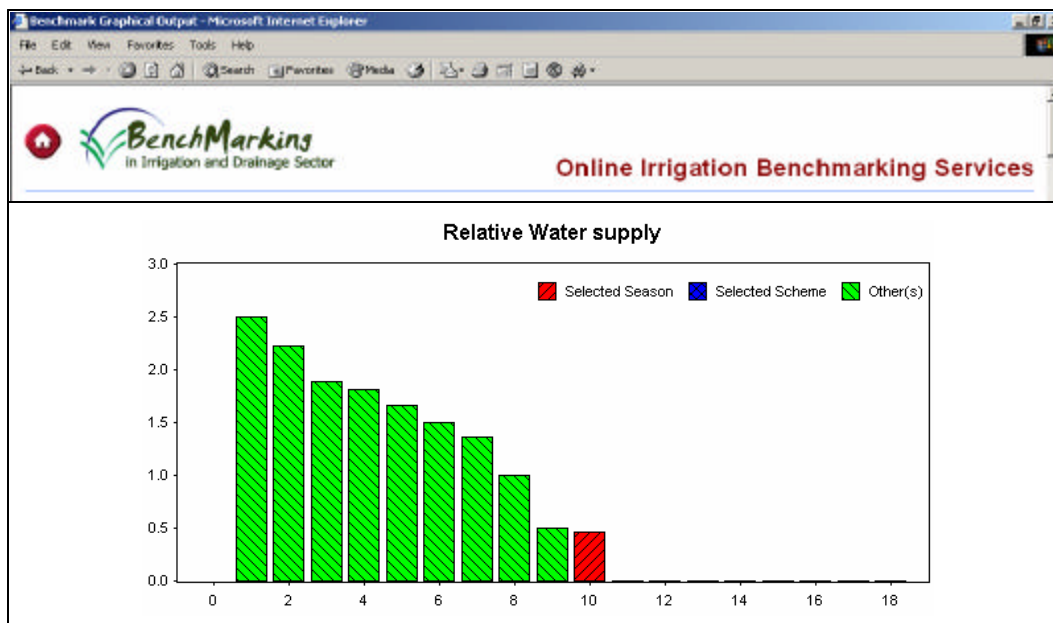


Figure 2. An example of OIBS Graphical Output

Further developments to the web interface and database were designed during October and November following up-loading of data sets from Mexico and Australia which highlighted some constraints inherent in the original design, based on the IPTRID Guidelines. A national workshop, organised by the Malaysian Department of Irrigation and Drainage (DID) in November 2002 produced a number of proposals for additional indicators and services that would address the requirements of

similar operating agencies. These enhancements to the OIBS web interface and database were released during 2003 following testing.

Tables 4, 5 and 6 summarise the registrations for use of the OIBS website in 2003 and 2004. Additional efforts were directed towards encouraging practising irrigation and drainage scheme operators to register with the site and to benchmark the performance of their schemes.

Table 4. Summary of Registered OIBS Users (August 2004)

Region	User Registrations
Africa	19
Asia	163
Australasia	8
Central Asia	4
Europe	58
North America	26
South America	9
WANA	11
Grand Total	298

Table 5. Summary of Irrigated Command Area Registered with OIBS, August 2003

Region	Size of Schemes in (ha)			Total
	Less than 2,500 (Small)	2,500 > ha <10,000 (Medium)	Greater than 10,000 (Large)	
Africa	112	2,900	-	3012
Asia	7,458	115,423	977,167	1,100,048
Australasia	-	5,402	1,956,675	1,962,077
Central Asia	16,665	57,176	447,246	521,087
Europe	2,838	8,937	31,668	43,443
North America	-	32,602	237,823	270,425
South America	103	-	-	103
WANA	-	-	-	-
Grand Total	27,176	222,440	3,650,579	3,900,195

Table 6. Summary of Scheme Locations Registered with OIBS, August 2004

Region	Number of Schemes			
	Less than 2,500 (Small)	2,500> ha <10,000 (Medium)	Greater than 10,000 (Large)	Total
Africa	1	1	0	2
Asia	25	19	22	66
Australasia	13	2	14	29
Central Asia	24	13	12	49
Europe	5	1	2	8
North America	0	4	2	6
South America	1	0	0	1
WANA	20	0	0	20
Grand Total	89	40	52	181

6. Conclusions

Benchmarking is a valuable tool that has been found to be of considerable use in enhancing performance in both public and private sector organisations. Its application in the irrigation and drainage sector is in its infancy.

Benchmarking in the public sector in general and the irrigation sector in particular is a more complex task than in many other sectors. Irrigation and drainage is always subject to site-specific characteristics, and key to the success of benchmarking is the identification of the main drivers that apply in each situation.

Benchmarking must be understood as an on-going process which must form part of the strategic management of the organisation. As such, it is critically important that the owners of the process, the system managers, clearly understand that benchmarking is an important tool for the strategic management of their organisation.

For benchmarking to work it must be pushed through by motivated individuals with support from the wider environment. This wider environment includes an enabling socio-political environment, and support from key stakeholders. The support or drivers for change in this sector is coming from a number of

areas, such as increasing pressure on available water resources due to population growth. Whilst changes may be required in the irrigation and drainage sector in general, it will be down to individual scheme managers to implement and take ownership of the benchmarking programme for their schemes. It will largely be their commitment and performance that will drive the success or otherwise of the process.

An international benchmarking initiative in the irrigation and drainage sector began four years ago supported by the WB, IPTRID, IWMI, ICID and FAO. Several countries have commenced the implementation of national benchmarking activities within the context of the initiative including Australia, Mexico, India, China, Egypt, Malaysia, Pakistan, France and Spain.

Whilst this initiative has spurred several agencies and countries into establishing a systematic data collection framework, few agencies have been able to complete the implementation process whereby benchmarking results are incorporated into the management process of the agency. A common set of features is beginning to emerge from these organisations. These include:

- Well developed strategic plans in which benchmarking play an important role in guiding the direction of the organisation

- Commitment to excellence in service provision
- Effective user participation in the management and operation of the system
- Effective policies for water resources and environmental management.

There are a number of initiatives underway to promote and evaluate the role of benchmarking in the I&D sector. The future success of benchmarking in the sector will depend on coordinating these initiatives to avoid establishing a multiplicity of competing benchmarking “standards” and approaches.

WORKSHOP ON BENCHMARKING AND QUALITY ASSURANCE
Montpellier, September 16, 2003

CONCLUSIONS

Following conclusions and recommendations were drawn from the round-table discussion following the individual presentations made on the progress achieved in the implementation of the benchmarking and quality assurance process in the participating countries.

- Overall, it was recognised that there is a multiplicity of possible users of benchmarking (irrigation managers, government departments, financial institutions, researchers...). It is vital however to identify who is responsible for the process and the decision powers of the different actors. (Personnel who can act and change the management of the system). However, it was felt that the main target audience of the benchmarking initiative should be irrigation managers and the providers of irrigation services. Different countries have different resource structures, education levels, in which the stage of progress of benchmarking could vary, widely. It should be understood that not one size fits all.
- There has to be a line of accountability between the service provider and the user for benchmarking to become meaningful. In this context, it is important to recognise that as soon as someone is due to pay for a service he/she will consider him/herself as a client. This is different from a user in a state run enterprise who receives services for free or at a highly subsidised sum.
- It was recognised that countries use different denomination for users of water, e.g. customers, clients, users, etc. “The user obeys the government, the client decides”. In some countries farmers don’t feel like users and they don’t feel like clients, either or as owners. They hire staff to do the system operation, and will get them to do the benchmarking. The owners want their managers to learn. We need to move to an efficient learning process. We get our knowledge from doing benchmarking, either internal or external.
- When it is well understood by the managers and staff that they should tell the truth in relation to performance rather than allocating blame then they will be in a position to start improving performance.
- With regards to the different steps to be followed, several speakers stressed the need to integrate benchmarking with strategic planning – giving more importance, however, to the comparison with other organisations that have the same objectives or performed similar functions.
- There was a clear agreement that the indicators that need to be selected in benchmarking must be aligned with the objectives of the strategic process. However, collecting more systematically data for computing relevant indicators such as those proposed in the grid of the benchmarking

initiative can be extremely useful for governments or funding agencies in supporting their investment decisions. It provides a more comprehensive view on possible projects by complementing traditional economic indicators (financial or economic Internal Rate of Return, for example) with elements linked to irrigation management and irrigated agriculture. Thus, it can be instrumental in helping decision making. It also enable agencies/systems to be compared with similar agencies around the world.

- Benchmarking is a learning process. One can benchmark the output performance indicators to see where the organisation stands (in comparison or) relative to others and then use other performance indicators in diagnostic analysis of the processes and the causes affecting performance. Benchmarking has its benefits in learning about what is happening. “We know what we know, and we don’t know what we don’t know”. The things that you don’t know about can often be the things that cause problems. Benchmarking helps to identify these elements.
- There are two parts to benchmarking (a) to compare performance and (b) to introduce new ideas. One needs to make a strategic assessment of where the organisation wants to be in future. The end product of benchmarking is bringing about change.
- Benchmarking is a horizontal process rather than a top-down or bottom-up process. It is driven by the providers themselves.
- The benchmarking process itself is more important than the indicators. One should avoid getting hung up on the indicators. These are useful tools and the indicators in the IPTRID document are a start. They are not meant to be prescriptive. There can be additions or deletions depending upon the particular system and circumstances. It is always recognised that each country/scheme would have its own indicators; what we do want is some consensus on key indicators for comparison.
- The costs of collecting benchmarking data must be kept in perspective and it should be ensured that the derived benefits are sufficient to cover these costs and yield in fact good return.

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