

Deliverable 5 Final Report

Status: Public

EQUIP

Contract No UR-98-RS.3076

Project

Co-ordinator: University of Newcastle upon Tyne (NCLU)

Partners: VIATEK Viatek Ltd, Tampere
ASM ASM Brescia SPA
BOKU Universität für Bodenkultur
ETTS European Transport and Telematics Systems Ltd
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Date: 25/9/00

PROJECT FUNDED BY THE EUROPEAN
COMMISSION UNDER THE TRANSPORT
RTD PROGRAMME OF THE
4th FRAMEWORK PROGRAMME

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The Commission of the European Communities has financed 80% of this research work within the Fourth Framework Programme for Transport Research and Technological Development.

DOCUMENT PRODUCED BY

Responsible Organisation

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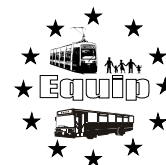
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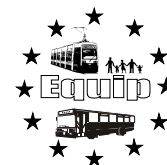
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Executive Summary

This Final Report (Deliverable D5) summarises the Extending the Quality of Public Transport (EQUIP) project, which has taken place in the Transport Research Programme of DG TREN in the Fourth Framework Programme of the European Commission. The two core objectives of EQUIP have been to develop a toolbox in the form of a Handbook for self-assessment of the internal performance of local public transport operators and to ensure, by means of awareness raising activities and liaison activities, that potential users of such as Handbook are aware of its existence.

EQUIP has focused on local surface-based public transport (bus, trolley bus, tram/light rail, Metro and local heavy rail), although the concepts and principles are equally applicable in the wider transport system. The methodology is based upon the Continuous Improvement Process, a cyclical model that proceeds from self-assessment to comparisons with an anonymous database to full direct benchmarking with other users. It is emphasised that this process does not lead to improvement in itself, but is the catalyst for change.

The EQUIP project has functioned in four phases, starting with preparatory work looking at existing methods and indicators. A comprehensive literature review examined 153 EU projects, publications and other related projects. A total of 111 indicators were classified into 12 clusters which formed the foundations for the second phase, developing the EQUIP Handbook.

The third and fourth phases of awareness raising and dissemination took place simultaneously with - and were an integral part of - the developmental activities. The key activities were the development of the EQUIP project Website (<http://www.europrojects.ie/equip>), the distribution of a brochure and newsletter at pivotal points during the project and the targeting of conferences, publications and workshops.

The primary target audiences were operators, authorities and their national associations. Distribution of the brochure together with direct contact led to the formation of the EQUIP Network, whose role was to contribute to developing and piloting the draft EQUIP Handbook, principally using the fora of two rounds of national workshops (autumn 1999 and spring 2000). There was considerable interest in participation (leading to a final membership of 99) which is attributable to the movement of public transport provision towards being an economic business rather than just a social service. The International Union of Public Transport (UITP) was also an important stakeholder, due to its respected and widespread position in the public transport industry.

The final EQUIP Handbook was presented to an international audience at a workshop in Vienna in June 2000. The Handbook is composed of two parts: Part I, Method, describes the rationale for benchmarking and the data handling methodology used in EQUIP; Part II is composed of the list of Indicators in a format ready for self-completion, together with an accompanying Guide to Completion. This Guide provides a checklist for completing the Handbook and establishes the questionnaire design and data processing method for opinion surveys. Key characteristics of the Indicators list are the allocation of the 91 indicators to 11 clusters of related indicators: a list of system definitions used in the Handbook; a table of elements of indicators that occurred more than once in the Handbook (Common Elements); clear definitions of indicators with components clearly colour coded; supplementary information to assist in the completion of indicators; recommended sampling periods and methods; a commentary describing related indicators and areas for in depth further analysis. This Final Report shows a selection of indicators which exemplify these characteristics. One version of the Handbook has been created for each of the five modes; these are available in electronic and paper versions. All quantitative indicators in the electronic version are



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calculated automatically, including the weighted averages for passenger and employee opinion questionnaires. A key development is the set of 27 “super indicators” which provide an entry level to benchmarking. This evolved in response to feedback from the EQUIP Network concerning the demand on resources to complete the full Handbook.

The final Handbook is suitable for use by operators from diverse operating environments. Its current application is for self-assessment, but it is capable of national and international benchmarking between operators. However, it is only the first step in successful benchmarking and it is recommended that the formalisation of the benchmarking process should take place by introducing mechanisms to support users. This can be achieved by institutional sources providing time and manpower resources, formalising standards and underwriting confidentiality and stability. Additional objectives include the appointment of a trusted holder of the EQUIP Handbook, the introduction of an external helpline, the formation of specialised benchmarking groups and support for higher level benchmarking using the EQUIP tool.

EQUIP identified a number of necessary conditions for reaching the goal of institutionalisation. The Handbook must be available in the relevant national language. The database, data analysis and the Handbook must be managed so that they are up to date and this must be carried out by a manager who must not benefit from having access to the data. Finally, responsibility for the benchmarking exercise must lie with the operators, who need to bear the responsibility for the cost of improvements.

It is felt that the National Associations of public transport operators are the key to the continuation and development of benchmarking networks throughout Europe. There is some urgency surrounding these next steps as a significant gap in time is likely to lose the impetus created by EQUIP. Perhaps more importantly and more significantly, elapsed time allows variations in indicator sets to be developed in different countries thus losing the international comparability offered by use of the EQUIP Handbook.

This Report recommends:

- **The National Associations are brought together to discuss the harmonisation of benchmarking activities.**
- **As a trans-national entry point, the “super indicator” set developed in EQUIP could be implemented.**
- **Operators could be encouraged to develop their datasets with training and support provided by the National Associations, thus recognising that true added value is only realised by achieving real improvements.**
- **As a matter of urgency, the CEC is urged to fund a Workshop of National Associations. This is a short term response to ensure the impetus created by EQUIP is not lost but does not negate the need for longer term planning to address the issues in this document and in other EQUIP Deliverables.**



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Introduction

Objectives of EQUIP

The Extending the Quality of Public Transport (EQUIP) project has taken place within the Transport Research Programme of DG TREN within the broader Fourth Framework Programme for R&TD of the European Commission.

The core objectives of EQUIP have been to:

- Develop a toolbox in the form of a Handbook for self-assessment of the internal performance of local public transport operators.
- Ensure, by means of awareness raising activities and liaison activities, that potential users of such as Handbook are aware of its existence.

Ultimately, the EQUIP project has wanted operators to utilise the approach developed within the project, and in this way, to enable quality, effectiveness and efficiency gains. In addition, the project has wanted decision takers, procurers of passenger transport services and associations of transport operators to be aware of the EQUIP approach and to promote the achievement of better quality by individual operators.

The major, and most tangible, output of EQUIP is the **Handbook for the self-assessment of internal quality performance by land-based public transport operators**. This Handbook deals with all aspects of the service as provided by the public transport operator as well as relevant aspects of transport system operation. It uses the main indicators developed by the European Committee for Standardisation (CEN)¹ as the starting point and covers all modes of local transport (bus, trolley bus, tram/light rail, Metro and local heavy rail). In this way EQUIP has provided an in-depth and mode based analysis in contrast to the 1998/99 Pilot benchmarking of local transport systems which worked at an urban transport systems level.

Scope of EQUIP

The EQUIP project has dealt with the benchmarking of efficiency in public transport. Specifically, it has dealt with the internal efficiency of the public transport operator – the capability to achieve planned outputs within performance targets, and the optimal use of resources to achieve this. Quality of service and customer satisfaction were considered to be external factors, and were only used within EQUIP where they had internal relevance. This is not to say that they were somehow less important – it is simply that the external factors have been well considered in other work, whereas EQUIP focused on the operator.

EQUIP has focused on collective passenger transport. The project has worked within the following parameters:

- The surface transport modes of bus, trolleybus, tram/light rail, Metro, local heavy rail, and demand responsive transport services were specifically included.

¹ Recommendations on Public Transport Quality by CEN, the European Committee for Standardisation.



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- Long distance rail, waterborne and air modes, as well as taxi and personal modes have not been included within the scope of work.
- Urban, suburban, peri-urban, regional, inter-urban and rural services for the above modes have all been taken into account. International and cross-border transport have not been included.
- The geographical focus has been on Europe, and the EQUIP network of operators was drawn entirely from European operators and authorities. Relevant non-European references were also researched, particularly from North America.

EQUIP has focused primarily on the provision of local public transport. The concepts and principles are likely to be equally applicable to the provision of planned or procured inter-urban services as well as in the wider total passenger transport system although the reference values are likely to be different.

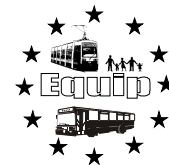
0.1.1. The Role of Continuous Improvement for Public Transport Operators

Public transport operators face a wide range of business pressures, including one or more of the following: staying within cost/budgetary targets (sometimes with reduced finance available); meeting or exceeding profit targets; succeeding within a competitive commercial environment; preparing for a new competitive environment, with competitive bidding for routes; meeting the requirements of funding agencies; meeting performance or quality targets; and introducing new services or techniques. Finally, court rulings/new regulations may impose costs, or require changes in order to avoid extra costs.

Operators respond to these pressures either through making improvements (thus remaining viable or becoming stronger) or by inertia (requiring stronger intervention at a later point, or failing). The dynamic for change is normally a business or external stimulus.

Operators can respond by making improvements that increase the productivity of labour resources, assets, service levels or outputs from the available resources. They may also implement new organisational structures, delivery methods and working practices. An increased revenue earning base and/or collection method is beneficial. Strategic capability and intelligence can be improved. Improved employee satisfaction and/or conditions may bring about increased reliability or quality levels within defined targets.

Improvements can either occur on a one-off basis, or they can be part of a permanent value-adding process. The latter is normally called the Continuous Improvement Process. Continuous Improvement is an ongoing process within an organisation, and can be considered as a corporate frame of mind. The organisation recognises that it must evolve to meet the changing environment and market, and its customers (external and internal) have ever-increasing expectations. The organisation identifies its weak points, and implements actions to adapt or restructure itself for better performance. This assures customer satisfaction, and minimises opportunities for competitors. Overall, the process aims to add value throughout, by optimising both efficiency and effectiveness.



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The Continuous Improvement Process is an inclusive one, encouraging team-building within the organisation, and involving all layers of management, administration and staff. It is also a cyclical process, which challenges complacency. At no point does the organisation consider that it is perfect, so that even after a full iteration, it presumes that more improvements can be made.

The process is illustrated in Figure 1.1. This shows a nine-stage model which begins by identifying factors which are critical for the success of a business and measurement of relevant indicators (stages 1-3), proceeds to analysis of the operator's performance and business (stages 4-6), and finally develops, implements, and monitors affirmative action plans (stages 7-9). The loop returns to stage 1, and there may be a number of loops operating in parallel.

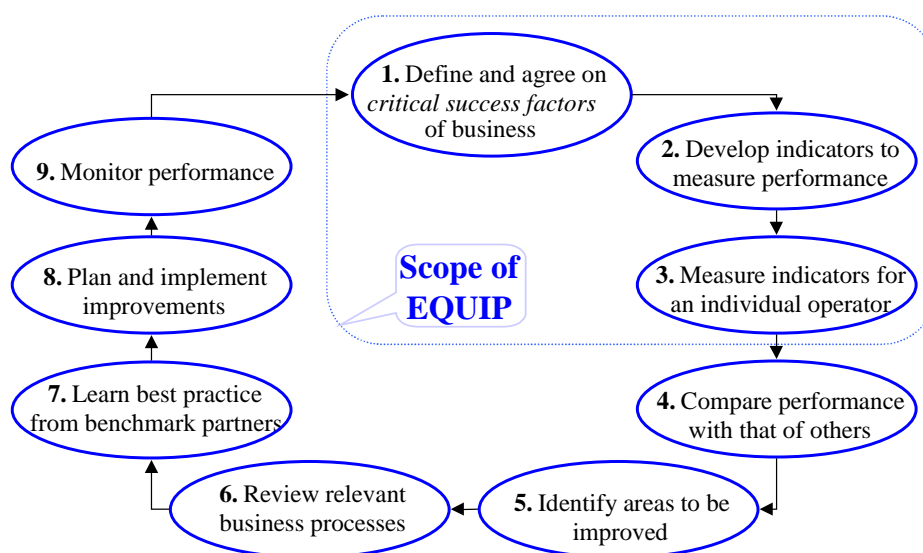


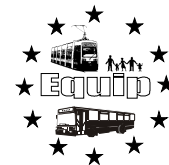
Figure 0.1 The Continuous Improvement Process – a nine-stage model²

0.1.2. The Role of Benchmarking in Continuous Improvement

Benchmarking is a fundamental tool in the Continuous Improvement Process. Three progressive levels of benchmarking can be defined which involve increasing commitment and co-operation by the user (see Table 1.1). Self-assessment (the scope of EQUIP) covers stages 1-3 of the Continuous Improvement Process, whilst comparison with data from other organisations takes a user to stage 6. By working directly with other organisations, the full cycle can be completed.

Benchmarking is about measurement and comparison. It helps the organisation move from perception to facts, and provides a holistic view of the organisation. It is important that relevant, measurable and comparable indicators are selected which can describe the processes

² After Hanman, S (1997) Benchmarking your firm's performance with best practice. *International Journal of Logistics Management*, Volume 8(2), pp1-8.



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of the organisation and the EQUIP project has played an important role in carrying out this, on behalf of – and in consultation with – the industry.

Level	Category	Elements
1	Self-assessment	Measure your own performance.
2	Comparison	Compare your performance with a database of values. Identify improvement areas and best “standards”.
3	Partnering	Work with relevant partners, perhaps with some outside your direct business sector. Exchange confidential information. Learn best practice and the means of implementing the change. Ideally, this should be a two-way process.

Table 0.1 Benchmarking Levels

Using such indicators, benchmarking allows the organisation to compare its performance with that of its peers. This gives three primary results:

- Areas of good performance are identified – the strengths of the organisation;
- Areas of potential improvement are identified – the weaknesses; and
- The scale of the potential improvements are quantified – the potential added value.

After the benchmarking phase whether at Level I, II or III, the organisation has gained an in-depth knowledge of itself. There is a common understanding by all of the participants, and it removes doubts and wrong perceptions. The measurement process provides a baseline data set for improvements and for target setting, which is understood throughout the organisation. The areas for potential improvement will have been identified, target values (perhaps with intermediate milestones) will have been set, and there will be an estimate of the value gain for the organisation. The team building achieved in the benchmarking activity will provide the platform for the action teams which must achieve the improvements. If successfully done, there will be both consensus and a corporate motivation for change.

0.1.3. Achieving and Sustaining Improvements

Benchmarking is a key step in the Continuous Improvement Process but does not add value in itself – it is the catalyst to change. The true value is only added through achieving real improvements. Whilst this was beyond the scope of the EQUIP project, some recommendations are offered:

- Improvements must be linked to clear and achievable benefits.
- Potential improvements must be prioritised according to value-added or “must-do”. This is particularly important in the first iteration, when many possible improvements may be identified.



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- Performance Improvement Teams should be established with a well-defined brief and working method.
- There needs to be adequate committed and dedicated resources, backed by both commitment from management and problem-solving support.
- Where possible, partner with peers to import knowledge, experience and techniques.
- During the process of change, make ongoing measurements and retain the possibility for fine-tuning and adjustment.
- Monitor the implementation and results for a sufficient period.
- Afterwards, quantify the benefits and costs – this both provides feedback to the improvement processes, and will help to sustain commitment from the stakeholders.

It is important that the process is permanent and cyclical. It is possible that there may be a number of phased cycles. For example, maintenance productivity and work practices might start ahead of improvement in employee satisfaction (which is complex and requires building trust), whilst asset related improvements may have to be linked to the purchasing opportunities for the asset group (such as bus replacement).

The EQUIP Methodology

The Handbook has been developed through an iterative process with considerable participation by the industry sector. An extensive search was carried out to identify relevant indicators which were then refined and clustered (Deliverable D3), and supported by a comprehensive measurement methodology (Deliverable D4). The draft version of the Handbook was developed and used by the EQUIP Network of operators for self-assessment. This provided validation and feedback to produce the final version for public release.

EQUIP has built on prior work within the Transport Research Programme of DG TREN. The Improved Structure and Organisation for Transport Operations of Passengers in Europe (ISOTOPE) project examined alternatives frameworks for the planning and regulation of the public passenger transport networks, and for the procurement of the services. The Quality Approach in Tendering Urban Public Transport Operations (QUATTRO) project developed indicators to measure quality of service, and this work has been carried on within CEN TC 320 to move towards standardisation. DG TREN has sponsored the Pilot Project on Benchmarking, which establishes general benchmark data on transport in cities. Following an initial set of 15 cities, a new initiative is expected to increase this to more than 100 cities. In addition to the projects, EQUIP has identified some 139 literature references, 16 projects, 11 workshops and 10 benchmarking projects which provide both research and real-world source material. This collective of contextual work and source material has been combined with direct participation from industry to assure a high level of completion and stability.

The EQUIP project has functioned in **4 phases**:

1. *Preparatory*: An investigation was carried out of existing work to identify methods of benchmarking used within the public transport industry and to identify indicators used within the sector.



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2. *Developmental:* The EQUIP Handbook was developed by the EQUIP team using a consolidated set of indicators and placed within a structured self-assessment format. The Handbook was pre-tested with the operators, and validated in the testing phase.

3. *Awareness Raising:* The EQUIP Consortium put a substantial effort into raising the awareness of both the role of benchmarking within passenger transport, and in the existence of the Handbook. Part of the awareness raising has been to help distinguish between “Quality” and “Efficiency”, with the latter being the domain of EQUIP.

4. *Dissemination:* Having developed the Handbook, the EQUIP Consortium endeavoured to ensure that the materials are well disseminated. This has been achieved through various media including the project Website, this Final Report, and by making the Handbook available in both printed copy and electronic format.

The Target Audience

This report is aimed primarily at practitioners in the public transport sector, including those in:

- Transport operating companies
- Transport authorities
- Research institutions
- Consultancies

Whilst the EQUIP project has tried to keep the language and terminology accessible to all readers, this document is intended mostly for the set of people who will either **implement** or **manage** the self-assessment and benchmarking actions within a passenger transport organisation. A shorter document on Conclusions and Recommendations has been generated for the decision-takers and other interested readers.

Whilst the principal focus of EQUIP has been on the internal performance of the local public transport operator it must be remembered that service provision, or supply, will naturally be influenced by what is demanded by the consumer. For local public transport there are two groups of consumers: the first group is the travelling public and the second is the procurers of local public transport on behalf of the travelling public (in most cases this is the local authority). As a result, the EQUIP project has investigated those supply-related indicators which are relevant to these consumers.

The Structure of the Final Report

This Final Report includes sections on the methodology developed (Chapter 2), the stakeholder involvement (Chapter 3), the use of the Handbook itself (Chapter 4), and how to move forward towards institutionalising benchmarking (Chapter 6). Specific technical sections, such as the Handbook itself, are placed in the Annexes to improve readability.



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Defining the EQUIP indicators

Literature review

At the beginning of the project an analytical framework was created in order to focus the review on relevant information sources. First, guidelines were created for a literature review, which was performed by all Consortium members in six EU countries and second, guidelines were created to review current or past benchmarking exercises and practices.

The following information was analysed and recorded for each information source: general information on the document (name, author, type, origin, date, location, language); a short summary; the existence of indicators; and the value for the EQUIP project.

Next, the individual indicators found from the information sources were reviewed, analysed and recorded in a tabular format. A checklist was used for this work phase. The checklist covered the following issues for each indicator: description of the indicator in general; availability of data and information on data collection methods; description of the interactions, correlation or dependencies of the indicator; evaluation of the applicability of the indicators for a benchmarking exercise and any other relevant information about the indicator.³

The main information sources in the literature review were the results from previous work within the EU and national bodies, technical journals and publications and the workshops and conferences. The literature review was specifically targeted at identifying information relevant to internal performance of public transport operators (organisation, cost, economic efficiency, viability, supply) and benchmarking in public transport.

Literature written in the native languages of the EQUIP Consortium members was collected, i.e. from Austria, Finland, Ireland, Italy, the Netherlands and the United Kingdom. The main national sources were university libraries and national publication collections. International literature was searched with the help of the Internet as well as the public and university libraries of each Consortium country involved. Also, the UITP library and the European Local Transport Information Service (ELTIS) were explored.

Most of the international findings were from the EU area, mainly EU projects. QUATTRO, Pilot and ISOTOPE are on-going or recently finished projects financed by the European Commission which analysed the quality of output or the internal performance of public transport operators. Parallel to these projects, CEN has developed a list of quality indicators for public passenger transport which is summarised in the document N73: “Service quality – definition, targeting and measurement.”

The review of these information sources found descriptions of current or past benchmarking exercises and practices in public transport, as well as indicators related to the evaluation of quality in public transport. Due to the lack of specific sources dealing with indicators

³ For a more detailed definition of the checklist contents, see Appendix 1 in Deliverable D3, *State-of-the-Art in Benchmarking*.



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concerning internal performance, a wide analysis was carried out in order to include all relevant information.

All findings in the literature, previous projects and workshops have been summarised and catalogued in a database which includes three kinds of information about each reference⁴. First, there is some general information about the reference, e.g. type of information source (report, article, thesis etc.), date and contact details to make it easier for readers to locate the document. The next part is a short summary of the document's substance. This consists of objectives, contents and results of the information source and describes whether the document includes some relevant indicators. Lastly, there is an estimation of the usefulness of the document for the EQUIP project. The last part is for subjective comments about the document and gives some additional information for the reader.

The purpose of creating the database was to store references in order to make them available for further analysis and development; furthermore, the database was also available to find information about benchmarking and quality indicators in public transport.

Summary of Results from the Literature Review

The results of the literature review were presented in Deliverable D3, *The State-of-the-Art in Benchmarking of Quality in Public Transport* which showed that there was a strong interest in developing quality tools, like benchmarking, for the public transport business. However, only a few real benchmarking exercises had previously been accomplished to assess the internal quality (efficiency and competitiveness) of public transport operators. The literature search provided EQUIP with an initial list of 111 indicators which were classified into twelve clusters (Asset/Capacity utilisation, Reliability, Production costs, Financial performance, Technical performance, Payment method, Environmental impacts, Employee satisfaction, Strategic status, Customer satisfaction, Safety and security, Legal and organisational framework).

The next steps were to further improve the indicators, and to develop a methodology for benchmarking with them. These were produced in the form of the draft EQUIP Handbook which was tested by the EQUIP Network and is described in the next chapter.

Involving stakeholders

The EQUIP Network

Simultaneously with the literature review, each of the EQUIP Consortium members established national networks of operators and users (authorities procurers of transport and passenger interest groups), which together formed the EQUIP Network.

⁴ Deliverable D3, Appendix 5: this database is an Excel file consisting of three worksheets (one for reports, publications and journals, one for previous projects and one for conferences and workshops). Full details can be down loaded from the EQUIP Website



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The objective of the EQUIP Network was to contact, and enrol in the Network, operators and authorities that had an interest in benchmarking local public transport. In the summer of 1999, a brochure was produced which introduced the EQUIP project and its objectives. It invited interested parties to contact the national representatives of the EQUIP Network for further details and to apply to join the EQUIP Network. Extra members throughout the project's lifetime using diverse media, e.g. the Website, attendance at conferences and workshops, publishing in journals and a pan-European Newsletter.

The EQUIP Network was an important part in the development of the Handbook as this was the mechanism for direct contact with key actors in the passenger transport industry. The ensuing input, feedback and validation ensured that the work in EQUIP was relevant to potential users.

The EQUIP project was successful in building a Network spanning all the Consortium member countries, partly because the creation of the Handbook was timely for both operators and authorities in terms of a response to changes in their working environment. This is discussed in Section 3.1.1 under the heading of the motivation to join the EQUIP Network. In the following section (3.1.2) the creation of the EQUIP Network is described. The significance of National Associations and the UITP for benchmarking is described in Sections 3.2.1 and 3.2.2.

In the first instance there were 13 operators and 4 users from 7 countries. This number was expanded substantially as the EQUIP National Workshops were organised in autumn 1999. At the end of the project there were 61 operators and 31 users from 8 countries. The members include transport operators from leading European cities (Rome, Graz, Rotterdam, Newcastle), as well as representatives of smaller, private operators. This provided the opportunity for exploitation and implementation of the EQUIP outputs. (Sections 5.1 and 5.2). In addition to the primary function of industry participation in the development of the benchmarking Handbook, the Network provided a key awareness raising and dissemination opportunity.

As the project proceeded, the focus of the EQUIP Network shifted from feedback to dissemination. The extent of the Network depended on the perceived value of the benchmarking Handbook, and the willingness of the members to share information in order to strengthen the benchmarking process increased.

0.1.4. Motivation to Join the EQUIP Network

Transformations in the economic and technological output and supply of public services have led to a radical change in the regulation and running of activities such as local public transport. Recent legislation has taken strengthened public regulation and control through the institution of independent authorities composed of experts and there is now a wider recognition of the right of economic initiative by means of contractual acts such as service contracts. Local public transport is now moving from being conceptualised as a social service towards that of an economic business satisfying a particular market of transport demand. It is



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clear that the liberalisation of the market is far from complete, but is still progressing. The European Community has recognised the market as the primary way in which to make the transport system competitive and users, citizens who ask for higher quality, integrated and flexible services, are being directed to the use of economically efficient modes within the busiest areas and along the most congested connections.

These changes mean that transport operators are faced with the need to change their frame of mind: the environment where the gap between costs and fares are met by transfers from the public no longer exists. When the public transport operator now receives transfers it commits itself to provide the service according to the terms of a specific service contract. Often, these service contracts will demand a specific level of service. These conditions have driven the environment where operators seek managerial efficiency and service quality improvements.

Competition with cars has led public transport operators across Europe to recognise the importance of improving the quality and efficiency of services offered. Public transport is facing an innovative development phase strongly determined by the introduction of marketing strategies and client oriented procedures. These are pushing the operators to monitor and improve their internal performances in order to achieve the best combination of product and market for their customers.

All these factors have meant that operators have been looking for some mechanism to investigate and achieve quality refinement and optimal (minimum cost) management standards. Benchmarking is perceived to fulfil this role. EQUIP aimed to contribute to raising benchmarking awareness through its activities as the EQUIP Network of public transport operators and local authorities shared experiences. The EQUIP Network thus offered the opportunity to focus on a series of comparison procedures amongst operators and authorities in order to identify the most suitable indicators to measure the strengths and the areas that could yield improvements in efficiency.

0.1.5. Establishing the EQUIP Network

In the process of targeting potential members of the EQUIP Network, a European mailing list of operators and authorities was created. Each Consortium member contributed to the mailing list by identifying possible members primarily within their own countries, but also in other European states. This was used in the summer of 1999 to send the EQUIP brochure which invited interested parties to contact the national representatives of the EQUIP Network for further details and for application to join the EQUIP Network. Utilising the International Union of Public Transport (UITP) membership list enhanced the mailing list, as the brochure was sent to potential interested members throughout Europe.

In the Consortium member countries, a letter (translated into the native language) accompanied the brochure to give a more personal invitation to join EQUIP. Both operators and authorities were targeted: the latter because of the potential for using EQUIP indicators in the tendering process for public transport services.



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In some of the Consortium member countries additional measures were taken to widen the membership of the EQUIP Network. In AUSTRIA, the Austrian Chamber of Commerce ensured good contacts with operators and a letter to accompany the EQUIP invitation. In FINLAND, potential operator members were selected from the membership catalogue of the Finnish Bus and Coach Association and were individually contacted. As the Irish public transport sector is dominated by the state-owned C oras Iompair Eireann (CIE) Group and private bus companies have limited opportunities to obtain licences for services, effort in developing the network in IRELAND focussed on potential members who were directly contacted as in Finland. In ITALY, EQUIP used the national focal points of the Italian Association of Public Transport Operators (Federtrasporti) and Pool Qualit  Trasporti (an Italian Working Group for the Quality in the Field of Local Public Transport) to form the national Network. In THE NETHERLANDS, the main source of contacts was the list of members from Mobis (the Association of Public Transport Operators), who also provided contacts to the public transport authorities. In the UNITED KINGDOM, the two main sources of contacts were the trade magazine Coach and Bus Weekly's annual directory of public transport operators and the Association of Transport Co-ordination Officers list of members.

Additional contacts were made through personal knowledge, e.g. a UK based Metro benchmarking network, known passenger interest groups and a supplementary list of operators in the northeast of England. In addition, a press release generated some interested parties.⁵

Other Important Stakeholders

0.1.6. National Associations

Most European countries have national transport operator associations. The EQUIP project has identified that these associations have a very high potential to assist with reaching the large number of European passenger transport operators and have participate to different degrees in the national networks. They have the mechanisms already in place for dissemination, consensus forming, collective action within the industry, organising meetings and workshops, and implementing training and support for new procedures and methods. These associations typically have a substantial membership base covering most operators within their country including small operators; and many of the members are not participants in any other association, and who do not have any other significant channel to external developments and advances in the transport sector. They use stable and well-known (in the national industry) dissemination channels which include annual conferences and theme-related workshops. They are a focus for training services to the industry and have a strong interest in promoting new and best practices to their members. Perhaps most importantly, they hold the respect and trust of the collective of national and local operators, who may be strong competitors with each other and not willing to participate in any other collective activity.

⁵Detailed information on how the EQUIP Network was formed can be found in Deliverable D4, *The Benchmarking Handbook*.



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0.1.7. The UITP

The International Union of Public Transport (UITP) is a long-established international organisation based in Brussels and is the most representative worldwide body dealing with public passenger transport. The UITP has a strong interest in the improvement of the passenger transport sector, promotion of best practice, and stimulating interaction and exchange of experience within the industry. The UITP also has an extensive dissemination structure, database, bi-monthly publication, and regular conferences.

The EQUIP project considered that collaboration with the UITP offered the potential to reach a very substantial audience. Further, because the UITP has such a strong position within the industry, if the UITP promoted or disseminated the EQUIP materials, then the audience would be more likely to examine them seriously (after that, of course, they are accepted or not on their own merits). Finally, the UITP offered the potential of a stable continuity mechanism for the EQUIP tools beyond the lifetime of the current project.

EQUIP has built up contacts with the UITP. A meeting was held in February 2000 to present the EQUIP materials and to identify potential future directions for benchmarking. After the formal ending of EQUIP in June 2000 there will be an on-going discussion with the UITP about the maintenance of the Handbook and the database.

The EQUIP Network's Review of Indicators and Development of the Handbook

Deliverable D3, *State-of-the-Art in Benchmarking of Quality in Public Transport*, identified a list of quality indicators (see Chapter 2) to be considered for the Handbook. In order to finalise the set of indicators, the opinions of potential users were sought by establishing the EQUIP Network of operators, local authorities and other interest groups. The EQUIP Network was an important part of the development of the Handbook. It was the forum for meeting key transport actors and to ensure that the work in EQUIP was relevant to potential users.

Workshops were held in each Consortium member country at which the list of indicators was discussed in relation to the objectives of this benchmarking project. The outcomes formed a substantial contribution to the draft Handbook. After translation (where necessary) and distribution, the Network piloted the draft Handbook and provided feedback. A number of issues were identified that were addressed in the final Handbook of ninety-one indicators in eleven clusters.

Thus, the EQUIP Handbook has been developed by a European Consortium in which the various levels of end-users views have been represented. It has benefited from a wide audience and has evolved to integrate best practises and different viewpoints.



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0.1.8. Outcome of the First National Workshops: Development of the Draft Handbook

The feedback from the first National Workshops was used to develop the draft Handbook which was translated, where relevant, and distributed to the EQUIP Network. Throughout the period of the draft Handbook development, the process of dissemination led to the expansion of the EQUIP Network.

The first round of the EQUIP Network workshops was held in autumn 1999 with each member country following a similar format. The objective of these workshops was to fulfil the criteria established in Deliverable D3 for the inclusion of an indicator in the draft Handbook. This was tackled sequentially by first establishing the areas of performance that were important to operators and authorities. Next, the list of indicators was considered in order to identify indicators considered to be of most value to benchmarking performance, identify indicators that would be difficult to measure, and consider the usefulness and ease of understanding the indicator definitions.

It was expected that there would be variation in the process and outcomes of meetings held in five different countries (Irish network members attended the UK workshops) and these are summarised in Deliverable D4, *The Benchmarking Handbook*.

0.1.9. Outcome of the Second National Workshops: Piloting the Draft EQUIP Handbook

The structure of the draft Handbook was designed to enable a user to complete it as easily and quickly as possible, but also to be able to consider benchmarking methodology in greater depth. The draft Handbook was composed of Part I, The Method (the background and motivation for benchmarking) and Part II, The Indicators (itself subdivided into two sections – the indicator list and a separate Guide to Completion).

A preliminary copy of the draft Handbook was discussed by the members of the EQUIP Consortium in January 2000. This led to a number of revisions to the content and format of the draft Handbook prior to distribution to the members of the EQUIP Network. Chapter 4 of this deliverable describes the final content of the Handbook. The following description only summarises the contents of the Indicator List (Part II) in the draft Handbook. All the indicators (Part II) were presented on one spreadsheet. The appropriate cluster was identified at the head of each page. The contents of the indicators were colour coded.

All indicators contained:

- Its cluster and indicator number.
- A short name.
- A definition.
- The recommended period(s) to be used for collecting data.
- The recommended method(s) of measurement to be used.
- Box(es) for the final value(s) of the indicator.



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Other optional boxes contained:

- Comments about the measurement of the indicator.
- Special instructions for calculating the indicator, e.g.
 - » To write “Yes” in appropriate boxes;
 - » To check the System Definitions sheet when collecting the data;
 - » To use the Common Elements sheet to save time in the calculation of indicators.
- A formula to be applied in calculating the indicator.
- Sub-sets of data for the indicator, e.g. the mode types, type of service area.
- Sub-sets of possible values, e.g. percentages.
- Component values to be used in the calculation of the final value(s).

Feedback forms were included as a means of assisting operators and authorities to formulate their responses and to assist with the interpretation of the feedback. Operators were asked how important each indicator was to the company, how easy each indicator was to measure and to add any other comments about the indicators. They were asked about the suitability of the terminology used in the associated questionnaires to employees and passengers and whether they were willing to ask the questions. The respondent was asked to identify any extra indicators that would be useful in the Handbook and to give an indication of previous experience of benchmarking. Respondents were expected to complete the feedback form whilst completing the indicators. Authorities were asked the same questions, except for commenting on the ease of measuring indicators.

Each member of the EQUIP Consortium was responsible for conducting the piloting of the draft Handbook. This involved the completion of the feedback forms and the draft Handbook, conducting a second round of national EQUIP Network Workshops, reporting the feedback to the EQUIP project co-ordinator.

At the second round of National Workshops an overall impression of the draft Handbook was obtained. Together with written feedback, a number of issues arose leading to suggestions for improvements to existing indicators, new indicators and new formats for the Handbook. These were used to construct the final Handbook⁶.

Analysis of the feedback forms showed considerable consensus amongst operators and amongst authorities concerning the relative importance of the indicators for benchmarking. There were some notable differences between the two groups, which reflected their differing priorities for a high performance public transport service.

The Method (Part I) was a very useful source of background information, although the Handbook was considered a little bit too theoretical by some users. The Guide to Completion of the Handbook (Part II) was easy to follow. The inclusion of a proforma for the

⁶ This process is fully described in Deliverable D4, *The Benchmarking Handbook* (Chapters 2 and 3).



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questionnaire was a big help for carrying out the opinion surveys. However, some operators stated that they did not have the knowledge to carry out a passenger survey themselves or to calculate the figures as requested in the Handbook. Furthermore, some operators were concerned about the difficulty of taking an unbiased sample without professional help which might lead to invalid results.

The method of presenting the indicators was appreciated, particularly the use of colour coding. The presentation of indicators in native language was regarded as essential. It was found that the indicators were easy to use and collect if the existing system used by the operator could provide the information. Some indicators posed particular measurement problem and if an operator had to use several hours of valuable time collecting of data, the indicator was likely to remain unused. The Employee Satisfaction survey posed management issues for some operators who believed it might raise unrealistic expectations about the prospect of reforms in operator practice and inviting employees to make unconstructive comments.

By and large, a considerable reduction in the size of the Handbook and the number of indicators was recommended – although there were also suggestions for more indicators. Operators consistently commented on the significant resource required to collect the large quantity of data needed to complete the draft Handbook, particularly the Customer Satisfaction surveys. As a result, many asked that the Handbook give an explanation of what happens if some indicators are left out, e.g. the effect on comparisons. In connection with this, a list of essential indicators was needed – perhaps with a chart showing a hierarchy of the indicators. It could also describe the value of each indicator and make links with other indicators. Since only one mode was relevant for many operators, therefore information concerning other modes made the Handbook seem long, therefore a Handbook for each mode was desirable.

The Finnish, Italian and some other operators had already established a national benchmarking exercise using similar or the same indicators. Generally, in these cases, interest towards the EQUIP Handbook was moderate as operators did not see added value in completing the EQUIP Handbook as well.

Some feedback suggested that the indicators were more suitable for operators who operate in the city centres and urban areas. As a result, it was suggested that different Handbooks should be developed for different target audiences.

The EQUIP Handbook

Introduction

The main tangible output of the EQUIP project was to produce a self-assessment Handbook for local public transport operators that had been tested in the field⁷. Four clearly identified stages marked the development of the Handbook over a period of eighteen months. It began with a list of over 400 diverse indicators sourced from the extensive literature review, followed by an iteration of these into clusters which were examined by operators and

⁷ Deliverable D4, *The Benchmarking Handbook*, charts the process of the production of the Handbook



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authorities in the EQUIP Network as described in Chapter 3 of this report⁸. This output contributed to the draft Handbook, which was piloted throughout the Network. Feedback led to the production of the final documents. The final Handbook is available in printed or electronic form from the EQUIP Website.

The final Handbook is available in a number of formats. There are five separate but compatible Handbooks for each of the land-based public transport modes (bus, trolley bus, tram/light rail, Metro and local heavy rail) as well as a short version of 27 “super indicators” to provide an entry to benchmarking. The final EQUIP Handbook is composed of two parts. Part I contains the Method, which covers the background to benchmarking and the motivation for carrying it out. Part II is divided into two sections: the list of indicators is in a format that is ready to be completed by the users. It is accompanied by a separate Guide to Completion.

Part I: The Method

This describes the method of the benchmarking process (see Appendix 1). This part of the Handbook is not required in order to complete the indicators, but it forms recommended background reading. It is expected that larger organisations will be more able to find the manpower and financial resources to refer to the methodology in preparation for completing the Handbook.

0.1.10. The Principle of Benchmarking

Chapter 1 (Rationale for the EQUIP Benchmarking Handbook) explains that the EQUIP Handbook is for use by operators of the most frequently used modes of land-based public transport, i.e. bus, trolley bus, tram, Metro/light rail and local heavy rail operators. It is suitable for different types of operator, e.g. small, medium large, urban, rural, inter urban.

The Handbook enables operators to make like-for-like comparisons with other operators. Benchmarking may be initiated because the company is not satisfied with one or more particular areas of company performance and/or the company wishes to improve its overall competitiveness in relation to other companies. Operators may be aware of how they perform, but measurements are often made in many ways so that they cannot make comparisons with others if they wished – the key objective of the EQUIP Handbook is to enable meaningful comparisons.

The EQUIP approach to benchmarking, based upon a nine stage cyclical process of full benchmarking (see Chapter 1 of this *Final Report*), is outlined in this Chapter of the Method and is followed by a number of Frequently Asked Questions and answers. These cover the likely questions that need to be addressed when benchmarking is approached for the first time and were compiled from those most frequently posed in the EQUIP Network. For example, in order to overcome the potential problems of benchmarking with competitors,

⁸ Deliverable D3, *State-of-the-Art in Benchmarking of Quality in Public Transport* gives the results of the full literature review undertaken in EQUIP and describes the process of collating indicators into clusters.



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confidentiality must be ensured and benchmarking must have the full consent of all partners involved; normally, benchmarking takes place between non-competing companies. Where partners have different regulatory systems or have different types of service area, the operator uses the first two clusters of Company Profile and External Influences on Operator in order to determine benchmarking partners that are appropriate to the operator's benchmarking objectives.

Chapter 2: How to use the Handbook for Improvement gives a flow diagram (Figure 4.1) which enables a company to place itself in the benchmarking process. The first stage requires a decision by senior management to undertake benchmarking. This is followed by the appointment of a person responsible for the benchmarking and, preferably, one or more Performance Improvement Team (PIT) is established. Generally, teams of experts are much more likely to succeed than one or two individuals. The composition of the PITs should reflect the areas of improvement under consideration, which may include employees from all levels in the company, e.g. drivers, maintenance staff and management.

In the next stage, the objectives of the benchmarking need to be established, and the operator needs to ensure that there is commitment to benchmarking, which should be supported by the presence of a facilitator and training for those collecting data. Having decided which level of benchmarking to carry out, the selection of indicators to be measured is made - if they are not all being measured.

Actions in the final stage depend upon the selected level of benchmarking. For self-assessment [Level 1] the indicators are measured, areas requiring improvement are identified, business procedures are reviewed and the indicators are monitored at regular intervals. An operator joins a network for Level 2 benchmarking. The measured indicators can then be compared with a reference database. This allows an operator to be more certain in identifying areas needing improvement than with Level 1 benchmarking. As with Level 1, the operator reviews business procedure without external support and repeats measurement at regular intervals. Operators embarking on Level 3 benchmarking proceed as with Level 2 up to the point where areas to be improved have been identified. Contact is then made with other network members and a suitable partner or partners are selected from whom best practice can be learnt. This is again followed by reviewing business procedures and repeating the process - possibly with other partners - at regular intervals.



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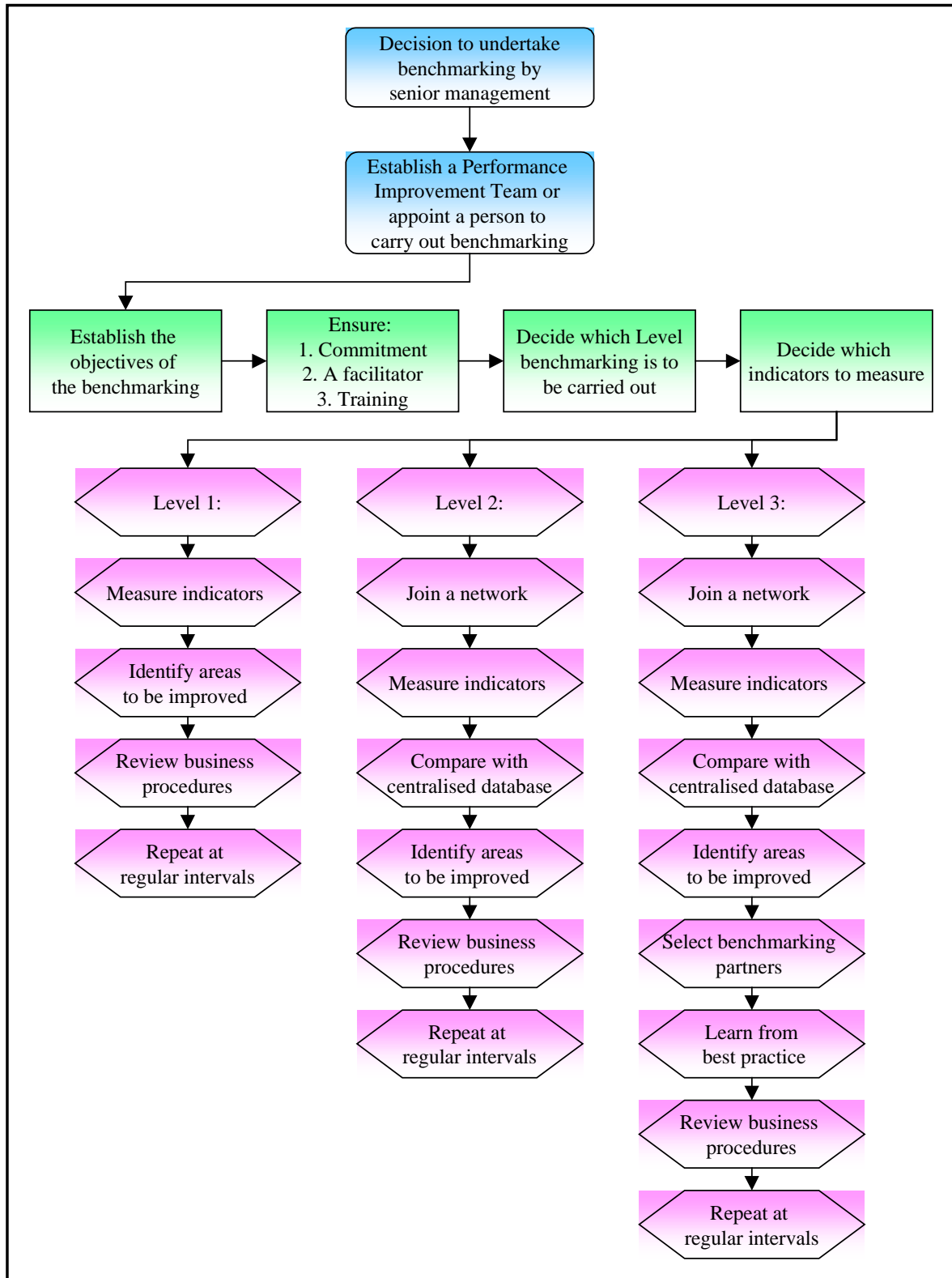


Figure 0.1 The Benchmarking Process



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Participation in Level 2 and 3 benchmarking necessitates the establishment of a confidentiality agreement between partners in order to protect the advice, data and information exchanged between partners. Partnerships may cease when partners have achieved the required improvement in specified indicators. Alternatively, companies develop on-going relationships that progress to work on other areas of the business.

In general, the more an operator progresses up these levels, the greater the benefits that can be achieved. Whilst a company can work independently at Level 1, progress beyond Level 2 depends upon finding a compatible partner or partners with whom to work in order to obtain the full benefits of benchmarking.

0.1.11. Data Handling

The three main characteristics of good quality data are described in *Chapter 3 (Measurement Methodologies)*; these are the collection of the same measurements (i.e. using the same definition); ensuring there is no bias in the measurements; and taking measurements with sufficient precision.

Sources of Data are described in *Chapter 4*. There are two methods of data collection described (100% records or sampling) which make use of two possible routes for collecting data for the benchmarking exercise (existing records or new recording systems). There are two categories of survey, which themselves are sub-divided into (i) technical and performance data (off-road and on-road data) which is generally objective, and (ii) opinion survey data (passenger and employee) which is necessarily subjective.

Off the road performance data is found in licensing records, company accounts, internal management accounting information and marketing information whilst on the road data requires surveys of service provision.

Opinion survey data is subject to cultural variation and personal variation. The attitudes and tolerance of individuals may even vary on different occasions. Passenger data is most likely to be collected and completed on the vehicle with or without the assistance of the surveyor. Employee data is best gathered by distributing the form with wage slips and returning them to a box (or boxes) located conveniently at the workplace.

Chapter 5 describes the process and problems associated with *Sampling*. Collection using a 100% record is straightforward but sampling requires further consideration. It is important to check that existing records are appropriate if they are used for benchmarking. New recording systems should also adhere to sampling procedures. The sample should be unbiased and representative of the relevant population.

For samples involving opinion surveys of employees and off the road technical and performance data, samples achieve a balanced view of the company by one of two methods. A sample is taken in proportion to the size of the employee/vehicle population by ranking



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vehicles/employees by date of entry into the company and then sampling every n^{th} vehicle/person to obtain the required sample size. Alternatively, for vehicles a sample may take the last 100 vehicles monitored by the company.

Opinion survey data from passengers should reflect variations in age, gender, ethnic, socio-economic status and level of mobility. Passenger numbers and composition are affected by time-related factors such as time of day, week or season. On the road technical and performance data are subject to these variations in passenger numbers as well as other traffic conditions, e.g. congestion.

In the Method three examples of data collection - using indicators from the EQUIP Handbook - are categorised according to technical and performance (off-road, on-road) data and opinion survey (passenger) data. Each example describes the population, together with a description of how to collect unbiased, representative data of a suitable minimum size.

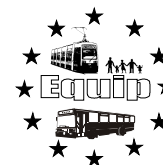
The *Estimation of Sample Size* is discussed in *Chapter 7*. The sample collected should be random in that the response or characteristic of one member of the sample is not affected by those of the other members. Since it is not necessarily practicable to obtain a genuine random sample, a representative range of conditions must be sampled. For indicators with a yes/no response (e.g. whether a departure is more than 5 minutes late), the minimum sample size should be 400. For indicators where the answer is coded as a number (e.g. the coded responses from an opinion survey) either the minimum sample size should be 400 *or* the sample size should be 100 and an estimation made of its variability in order to determine whether the sample needs to be larger.

0.1.12. Internal Public Transport Performance Indicators

Table 4.1 shows the cluster titles and the number of indicators per cluster in the EQUIP Handbook that are described in *Chapter 6 (The Indicators)*.

Company Profile indicators (Cluster 1) provide the background for selecting operators with which to benchmark as they describe how a company is organised and the level of penetration within its operating area. Some aspects of the company profile may limit the choice of potential partners, e.g. the size and location of the operating area and the type and number of competitors (if any).

The External Influences on the Operator (Cluster 2) form a key set of indicators for determining benchmarking partnerships. The influence of the outside world in which the operator provides its service may be significant for the performance of the operator. This is especially the case if benchmarking is on an international level and the operators come from different market environments with varying degrees of regulation and subsidy. In addition, the legal and operational environment may vary considerably between countries.



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Cluster	Cluster title	Number of indicators in Cluste
1	Company profile	21
2	External influences on operator	13
3	Revenue and fare structure	9
4	Asset/Capacity utilisation	8
5	Reliability	5
6	Production costs	3
7	Company performance	4
8	Technical performance	6
9	Employee satisfaction	12
10	Customer satisfaction	7
11	Safety and security	3
Total:		91

Table 0.1 The EQUIP Clusters of Indicators

Cluster 3, Revenue and Fare Structure, refers to the indicators that define the fare structure of the operator. This includes a general description of the fares over certain distances, together with a look at more detailed indicators such as the relationship between the cost of private and public transport, the ratio between single and monthly tickets, and the non payment of fares.

The utilisation of vehicles and manpower is the key to the fiscal performance of a public transport operator (Cluster 4, Asset/Capacity Utilisation). The most important indicators are those that consider how full the vehicles are, the time it takes for passengers to board the vehicle, the utilisation of the fleet and the drivers, and the distance travelled by vehicles that does not produce any revenue. These indicators are suited to international benchmarking as they are comparable and not dependent on monetary units.

Even if an operator utilises its assets well, its performance may be impeded by poor Reliability (Cluster 5). For example, services may be delayed or abandoned at the origin or during the journey and the operator may have difficulty in maintaining the planned headway. As with asset/capacity utilisation these indicators are well suited to international benchmarking as they are comparable and not dependent on monetary units.

Production Cost indicators (Cluster 6) measure how efficiently the operator is able to provide the service with the available resources. These indicators depend on monetary units. This limits their use as the financial operational framework should be similar between the operators that are benchmarking with each other. These indicators are very important and suitable for a national benchmarking exercise.

Most of Company Performance indicators (Cluster 7) are more suited to national rather than international benchmarking. The indicators chosen to measure company performance give a broad overview, such as patronage, the overall operating profit or loss, operating performance, net profit margin and interest cover. Trends over a period of five years are measured.



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There are two parts to the Technical Performance cluster (8): firstly, it measures indicators that directly affect on the road performance, e.g. fuel consumption, emissions, reliability and the installation of features that assist passenger mobility. Secondly, it examines the on going maintenance programme. Most of these indicators are suitable for international benchmarking.

Most of the Employee Satisfaction measures (Cluster 9) can be evaluated by the operator, using information in the company records. These indicators are suitable for international benchmarking, e.g. staff turnover, time off due to illness, the wage structure and training.

The best and almost the only way to get relevant information about Customer Satisfaction (Cluster 10) is to make a survey of the current public transport passengers. Survey results can be compared with the image that the operator has of its performance simply by asking the operator to complete the same questionnaires as the customers. In addition to customer opinions, hard measure indicators are also relevant for the benchmarking exercise, e.g. the number of complaints and accessibility to vehicles.

The Safety and Security cluster (11) covers the actual traffic safety of the operator and the safety of the working environment. It shows the number of incidents on the road, together with the number of injuries sustained by drivers and passengers. These indicators are suitable for international benchmarking.

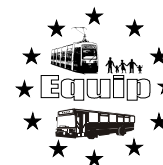
Part II: The Indicators

This contains a full list of the indicators and their definitions in a format that is ready to be completed by the operator and it is accompanied by a Guide to Completion of the Handbook (Appendix 1

0.1.13. The Guide to Completion of the Handbook

Chapter 1 of the Guide introduces format of the EQUIP Handbook, which is available in two formats (paper and Microsoft Excel files) that are ready for self-completion. Four sections preface the indicators themselves: a contents page, a list of indicators, a set of system definitions and a table of Common Elements found in the indicators. The indicators are specially defined for the purpose of this Handbook and it is important to use these definitions in order to ensure comparability of results between operators. Indicators require either qualitative or quantitative data.

Many indicators require the sub-division of information according to types within each mode, type of service area covered by the operator (urban access, connecting rural and urban areas, and rural access) and other sub-divisions facilitate the interpretation of the indicator, e.g. salary groups to find cost per employee; peak and off-peak services to find variations in planned operating speed during the day. Two clusters require the collection of opinion survey



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data from employees and passengers. A Microsoft Excel file calculates the weighted averages of the data for EQUIP.

In order to simplify the Handbook there is no sub division according to the size of the operator or the level of competition. However, indicators in the Company Profile and External Influences on the Operator clusters establish these factors and are taken into consideration when benchmarking with other operators.

The Guide summarises the procedures for sample measurement recording systems and sample size, as described in Part I: the Method. As with the Method, the Guide contains some Frequently Asked Questions and answers to help with the completion of the Handbook. For example, if there are limited resources for benchmarking, it is recommended that the Handbook of the 27 “super indicators” is completed, as they provide an entry level to benchmarking (Table 4.2). It may not be possible to split up data as required (e.g. cost data for buses and trolley buses) in which case both Handbooks are completed with the aggregated data and a note of the action is made. If the recommended units of measurement cannot be used, they can be replaced with local units, providing benchmarking takes place with operators using similar units.

Cluster and Indicator Number	Name	Cluster and Indicator Number	Name
1.1	Subcontracting of services	7.1	Operating profit or loss
1.3	Type of service area	8.2	Emissions
1.4	Vehicle kilometres	8.3	Fleet reliability
1.6	Fleet composition	9.1	Staff turnover
1.7	Passenger trips	9.2	Sickness
1.15	Operating speed	10.1	Passenger feedback ratio
2.9	External contributions to variable costs	10.3	Vehicle accessibility
3.3	Type of tickets	10.4	On board the vehicle
4.1	Load factor	10.5	At the stations/stops
4.2	Peak fleet utilisation	10.6	Information etc.
5.3	Abandoned service journeys	10.7	Transfers between vehicles
5.4	Delayed service journeys	11.1	Incidents
6.2	Costs per employee	11.3	Passenger health and safety
6.3	Costs per vehicle and passenger		

Table 0.2 The EQUIP Super Indicators

The *Method of Completing the Handbook* is described in *Chapter 2*. A flow diagram (Figure 4.2) acts as a checklist when completing the indicators. The background colours match those used in the relevant boxes in the Handbook. All operators complete the first indicator, which determines whether any on-road services are sub-contracted. If they are, a separate Handbook for such services should be completed for each sub-contractor. If not, the user completes the Common Elements sheet, as this data will then be ready at the appropriate indicators.



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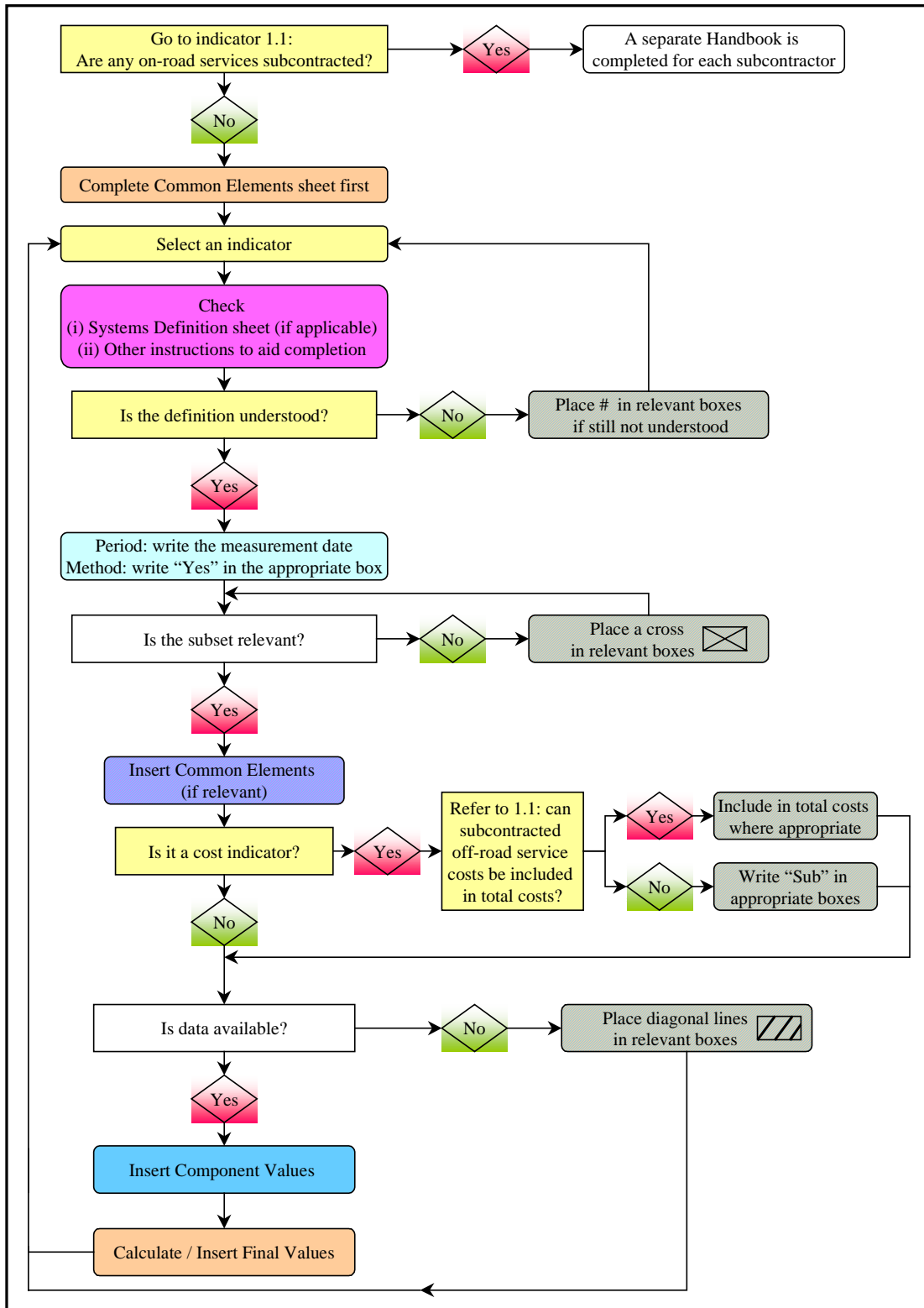


Figure 0.2 Checklist for Completing the EQUIP Workbook



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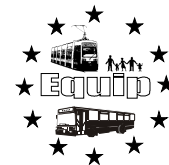
There may be a choice in the measurement period and method of data collection. The options selected are marked and the measurement period is specified. If there are sub-sets that are not relevant to the operator, these are marked with a cross. A user of the paper copy of the Handbook will refer to the Common Elements sheet - if it is relevant. The data are automatically copied from the Common Elements sheet in the electronic version. Cost indicators need to be treated carefully. The first indicator [1.1] also asks whether sub-contracted off-road services can be included in total costs. If this is not possible, the boxes are marked with Sub. If data is not available, whether temporarily or permanently, the boxes are marked with diagonal lines.

It is now possible to complete the component values of the indicator [if required] and calculate or insert the final values. At the end of the indicator a commentary box describes one or more of the following: its value in benchmarking; other indicators that it has an impact upon or have an impact upon it; or how the indicator can be examined in further detail. The process continues with the selection of a new indicator.

Three worked examples of indicators are included in the Guide which represent different formats for indicators that are found in the Handbook. Finally, in Chapter 2, the three options which are available to an operator having completed the Handbook are discussed. These are to use the Handbook for self-assessment (Level 1 benchmarking); to compare the data anonymously with another company on the centralised EQUIP database (Level 2) and lastly full benchmarking (Level 3) can be undertaken by seeking appropriate partners from whom best practice can be gained. At all levels areas of performance requiring improvement are identified, adjusted and monitored by taking repeat measurements regularly over a period of time.

In *Chapter 3*, the Guide makes very specific suggestions with regard to the *Questionnaire Design for Opinion Surveys*. For example the date, route, location on the route, number of passengers sampled and type of vehicle are recorded by the person carrying out a passenger survey. The Guide also includes a reproducible proforma for the questionnaire together with instructions for preparing them for use in the field (*Chapter 5, Example Layout of Questionnaires to Passengers and Employees*) which makes it clear that the respondent is being asked for his/her overall opinion of all journeys with the operator during the last 2 weeks, i.e. the questionnaire is not particularly about to-day's journey. If the operator is aware of the substantial use of more than one language they are advised to produce leaflets for these populations.

Passenger surveys should be carried out by the surveyor handing out the form as passengers board the vehicle, with completion by the passengers. The completed forms should be returned to the surveyor or placed in a labelled box before the passengers leave the vehicle. The surveyor should be available to assist passengers with queries concerning the completion of the questionnaire. Employee surveys should not be carried out as face-to-face interviews, in order to promote the confidentiality of the responses. Instead, the Guide suggests that the forms should be placed in the payslips; completed forms are placed in box(es) placed at convenient locations in the workplace.



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The co-ordinates of the weighted averages can be plotted on a graph (Figure 4.3) and the location of the point for each indicator will inform the user how important the indicator is, how well the company is performing and whether measures to improve the indicator are a matter of urgency. Observations in quadrants **A and D** are *above average importance* to the respondent (i.e. greater than 2.50). Improvement to any opinion rating would be worthwhile because the characteristic is important to respondents. Observations that fall in quadrant **D** *have a low opinion rating*, suggesting that improvement in this characteristic is needed. If the observation falls in quadrant **A**, *it has a good opinion rating*, so improvement is not likely to be as urgent.

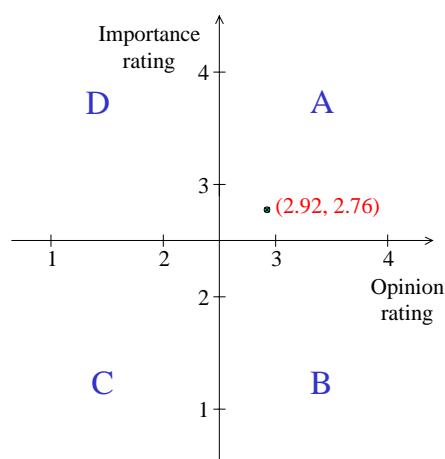
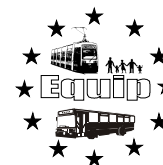


Figure 0.3 Interpretation of Weighted Average Scores for Opinion Surveys

In contrast, observations in quadrants **B and C** are *less important to respondents* (i.e. less than 2.50) and improvements to opinion ratings for these characteristics should take less priority as they are of less importance to respondents. In this example the plotted point falls within quadrant A, so it is of above average importance to the respondent. As it has an above average opinion rating, improvement is not of immediate importance for the operator.

0.1.14. The Indicators

Whilst the Guide to Completion of the Handbook is common to all modes, a different version of Part II: The Indicators is available for each mode. The Indicators structure is the same for each mode in order to permit intermodal data comparisons. Each mode is available in electronic and paper versions with the electronic version offering automatic calculation of indicators after the input of raw data.



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Having selected an indicator, the definition is checked by referring to the System Definitions sheet (if suggested) and any other instructions that assist with completion. If the definition is not understood, it should be marked in the boxes and the user refers to the holder of the Handbook for assistance.

Table 4.3 identifies the different versions and Appendix 1 contains a full copy of the paper version of the bus Handbook. Table 4.4 shows the breakdown of vehicle types within modes that is used in seven indicators. A super indicators Handbook is also available for each mode in electronic and paper formats (Table 4.3). Appendix 1 contains the paper tram version. [All versions of the Handbook will be available through the EQUIP Website].

Mode	Full Indicator List		Super Indicators	
	Electronic	Paper	Electronic	Paper
Bus except trolley bus	Bus_elec	Bus_papr	SuBus_el	SuBus_pr
Trolley bus	Tly_elec	Tly_papr	SuTly_el	SuTly_pr
Tram/light rail	Trm_elec	Trm_papr	SuTrm_el	SuTrm_pr
Metro	Met_elec	Met_papr	SuMet_el	SuMet_pr
Local heavy rail	Hvy_elec	Hvy_papr	SuHvy_el	SuHvy_pr

Table 0.3 Versions of the EQUIP Handbook

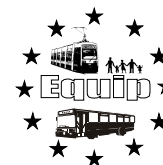
Bus except trolley bus	Trolley bus	Tram/light rail	Metro	Local heavy rail
Small (<5m)	Standard (<15m)	Single axle	Single car	Single car
Midi (5-10m inclusive)	Articulated	Double axle	Multiple car	Multiple car
Standard (>10 and <15m)	Double deck	Treble axle		
Double deck				
Articulated (single deck)				
Articulated (double deck)				

Table 0.4 Breakdown of Modes in the EQUIP Handbook

The **Contents** section of The Indicators outlines the title and purpose of the rest of the file. This is followed by a **List of Indicators** according to the cluster and page location on the spreadsheet.

A crucial contribution to successful benchmarking is the adherence of all participants to the definitions of indicators presented in a toolbox, regardless of whether that is the definition normally used by the operator. The EQUIP Handbook contains 21 **System Definitions** (Table 4.5). These terms form the basis for understanding the definitions of the indicators⁹. In the electronic version of the Handbook, the user is informed of these System Definitions at the relevant indicators.

⁹ Deliverable D3, *State-of-the-Art in Benchmarking of Quality in Public Transport*, initiated the process of identifying and defining key terms in a public transport system for the purpose of benchmarking.



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A number of elements of indicators appear more than once in the Handbook. These **Common Elements** are tabulated and the relevant indicators are listed. The user is advised to complete this page first so that the information is readily available when completing the indicators. The paper version of the Handbook includes this sheet on a separate card that can be referred to whilst completing the Handbook. In the electronic version of the Handbook, the values for the Common Elements are copied automatically to where they appear in the indicators.

System Definitions		
Bus systems	Night services	Service areas
Dead (or light) kilometres	Operational area	Service journey
Demand responsive transport services	Operator	Service kilometres
Employees (staff)	Passenger journey	Special transport services
Employees, number of	Passenger trip	Vehicles
Mode	Premium services	Vehicles hours
Network length	Route length	Vehicle kilometres

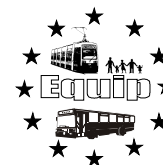
Table 0.5 System Definitions used in the EQUIP Handbook

Each cluster of **Indicators** is presented as a separate section. The appropriate cluster is identified at the head of each page. All indicators contain:

- Its cluster and indicator number.
- A short name.
- A definition. Quantitative indicators include a formula to be applied in calculating the value.
- The recommended period(s) to be used for collecting data.
- The recommended method(s) of measurement to be used.
- Box(es) for the final value(s) of the indicator. Component values to be used in the calculation of the final value(s) are needed for quantitative indicators. The indicator may require sub-sets of data, e.g. the vehicle types within the mode, the type of service area. There may be sub-sets of possible values, e.g. percentage bands for fare and service integration.
- A commentary box containing interpretational material and cross-references to other relevant indicators.

Other optional boxes contain comments about the measurement of the indicator or special instructions for calculating the indicator, e.g. to write “Yes” in appropriate boxes; to check the System Definitions sheet when collecting the data; or to use the Common Elements sheet to save time in the calculation of indicators.

The measurement period and method of data collection boxes are completed by writing “Yes” in the appropriate box for the method and specifying the actual measurement period used. The measurement period is specified since the date may explain unusual differences in results between operators, and it provides a record for operators wishing to carry out self-assessment at regular intervals.



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Wherever an indicator requires the calculation of a final quantitative value, all the component boxes are tabulated in order to provide space that allows all relevant data to be recorded directly in the Handbook. This assists with the manual calculation of the final values on the paper version of the Handbook and Excel equations on the electronic version automatically calculate final values from the component values.

The separate **employee and passenger opinion survey** file enables the calculation of the weighted averages of the responses (Appendix 1). Summary data is entered into the opinion survey sheets and the electronic version automatically calculates the weighted averages and copies them to the relevant locations in the indicator list.

Examples of Indicators

The following indicators demonstrate the composition and character of the EQUIP Handbook. The first appearance of key features are shown in *bold italics*. In each case the description of the indicator comes first, issues of data definition and collection next and finally a demonstration of how the Handbook links other indicators. Each indicator discussed here can be found in Appendix 1 in its relevant cluster of the full Handbook.

1.3 Type of Service Area [Cluster 1, Indicator 3, Company Profile]

1.3 Type of service area	Percentage of total number of services that operate in each type of service area.				
	See System Definitions sheet for definition of service areas (urban access, etc), and demand responsive transport				
	Place "Yes" in appropriate boxes.				
	Period: Most up to date information available				
	Method: Operator's personal knowledge				
	Percentage of Services				
	0-20	21-40	41-60	61-80	81-100
Urban access					
Connecting					
Rural access					
Demand Responsive Transport					
<p>The type of service area is an important description of the operation. Some operators will be hybrids (these are likely to be large companies). See also vehicle kilometres [1.4], fleet composition [1.6], passenger trips [1.7] and passenger kilometres [1.8]. In a number of cases a service will change its character during its route (e.g. it may start as a rural access service but end as a connecting service) - this variation is accommodated by the broad bands used to complete the indicator.</p> <p>[The EQUIP Handbook does not specify indicators that relate to the actual size of the operational area, as it is difficult to calculate, and may have limited meaning for operators where services are mainly connecting and/or rural access].</p>					

Figure 0.4 Example of EQUIP Indicator: Type of Service Area

This indicator (shown in Figure 4.4 below) is defined as the percentage of the total number of services that operate in each service area. Service areas are one of the *System Definitions*, so



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the user is referred to this section, in order to confirm the definition. The *sub-sets* are the three types of service area [urban access, connecting and rural access] together with the special case of Demand Responsive Transport services which have different spatial characteristics. Demand Responsive Transport services are also defined in the System Definitions.

The type of service area is an important description of the operation. Some operators will be hybrids (these are likely to be large companies). In a number of cases a service will change its character during its route, e.g. it may start as a rural access service but end as a connecting service. This variation is accommodated by giving five *broad bands* [0-20%, 21-40% etc.] to complete the indicator, for which the respondent only needs to write “*Yes*” in the *appropriate boxes*. Since Demand Responsive Transport services are only possible with buses, *crosses* are inserted in this row for the remaining modes, signifying that this subset is not applicable.

The EQUIP Handbook does not specify indicators that relate to the actual size of the operational area, as these are difficult to calculate and may have limited meaning for operators where services are mainly connecting and/or rural access. The *time period* for the data needs to be the *most up to date* available – for which the date of collection must be given - and the *method* used to collect the data is assessed by the *operator’s personal knowledge*. Other indicators that help to define an operation are shown to include vehicle kilometres [1.4], fleet composition [1.6], passenger trips [1.7] and passenger kilometres [1.8].

1.4 Vehicle Kilometres [Cluster 1, Indicator 4, Company Profile]

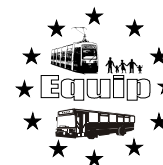
The number of vehicle kilometres is the average annual distance travelled per vehicle, i.e. between departure from the depot and return to the depot at the end of a shift. Two *formulae* are given for this *quantitative indicator* (Figure 4.5):

total vehicle kilometres = total service kilometres + total dead kilometres

average vehicle kilometres = total vehicle kilometres / the number of vehicles

As with indicator 1.3, vehicle kilometres are defined in the System Definitions, together with the components of the indicator (service kilometres, dead kilometres and number of vehicles). *Additional instructions* recognise that operators may have difficulty in segregating service kilometres and dead kilometres, in which case *diagonal stripes* should be placed in the appropriate boxes to show that the *data are not available*. Dead kilometres, vehicle kilometres and number of vehicles are all components of at least one indicator, therefore they are found on the *Common Elements* sheet, which will have been completed before any of the indicators. In the electronic version of the Handbook the data for these components is automatically copied to the indicator. The sub-sets for this indicator are the types of vehicles [e.g. in the bus mode these are small, midi, standard, double deck, articulated single deck and articulated double deck]. An *annual period of measurement* is required for this indicator, based upon either *existing records, or a sample or a full measurement recording system*.

Vehicle kilometres are an overall measure of route coverage. Lower values are typical of urban access routes with good coverage, whilst higher values typify rural access and



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connecting services with poor coverage. A reduction in vehicle kilometres per vehicle over time suggests that the fleet of vehicles [1.6] is too large or that the peakiness of the service has risen, which can be assessed by monitoring peak fleet utilisation [4.2] over time.

1.4 Vehicle kilometres	Average annual distance travelled per vehicle, i.e. between departure from the depot and return to the depot at the end of a shift.				
	Total vehicle kilometres = total service kilometres + total dead kilometres				
	Average vehicle kilometres = $\left(\frac{\text{Total vehicle kilometres}}{\text{No. of vehicles}} \right)$				
	If it is not possible to segregate service kilometres and dead kilometres, place diagonal stripes in the appropriate boxes.				
	See System Definitions sheet for definition of dead kilometres and service kilometres				
	Dead kilometres, vehicle kilometres and number of vehicles: see Common Elements sheet.				
	Period: Annual				
	Method: Existing records				
	Full measurement recording system				
	Sample measurement recording system				
	Total service kilometres per year	Total dead kilometres per year	Total vehicle kilometres per year	No. of vehicles	Average vehicle kilometres per year
Bus: total					
Small					
Midi					
Standard					
Double deck					
Articulated single deck					
Articulated double deck					
This is an overall measure of route coverage. Lower values are typical of urban access routes with good coverage, whilst higher values typify rural access and connecting services with poor coverage. A reduction in vehicle kilometres per vehicle over time suggests that the fleet of vehicles is too large or that the peakiness of the service has risen (see peak fleet utilisation [4.2]).					

Figure 0.5 Example of an EQUIP Indicator: Vehicle Kilometres (bus except trolley bus)

1.6 Fleet Composition [Cluster 1, Indicator 6, Company Profile]

This is the number and average age of each type of vehicle used (owned, leased, hired) by the operator. The average age is defined as the total age of all vehicles divided by the number of vehicles. Additional instructions require that the age of the vehicle is calculated from the first date of registration and the calculation does not take account of refurbishment to vehicles.

The two components of this quantitative indicator are the total age of all vehicles and the number of vehicles, the latter being first found on the Common Elements sheet. The sub-sets are the types of vehicles within the mode, as shown in vehicle kilometres [1.5]. The data should be the most up to date available, being drawn from existing records or by carrying out a full measurement recording system.



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The average age of light chassis vehicles (e.g. small and midi buses) should be much less (e.g. 4 years) than heavy duty chassis vehicles (e.g. most single and double decks), whose average age could be around 8 years. The percentage of vehicles with low floor accessibility, which is an important attribute of fleet composition, is given in vehicle accessibility [10.3].

1.20 Internet Information [Cluster 1, Indicator 20, Company Profile]

This is a *qualitative* indicator that simply asks about the presence of information concerning public transport services on the Internet/minitel. Additional instructions require “Yes” to be placed in appropriate boxes which are categorised into various aspects of the business [fares, routes/timetables, trip planning, real-time information, company information and customer feedback], together with a distinction between the use of the company’s own Website (if it has one) and another Website. As with type of service area [1.3], there is no choice in the measurement period and method, these being the most up to date information and using the operator’s personal knowledge respectively.

Pre-trip planning is an important part of making a journey. It is particularly useful if real-time information is available. Rapid access to a customer feedback forum will impact upon customer satisfaction [10.6].

2.13 Segregated Lanes for Public Transport [Cluster 2, Indicator 13, External Influences on Operator]

This is the percentage of the network where public transport is segregated from private cars during peak hours. The main instruction for completing the indicator is to place “Yes” in the appropriate boxes. The indicator is presented in two stages: firstly, the presence of segregated lanes is indicated and secondly, the approximate percentage of the network length that is segregated. In some indicators the Handbook caters for instances where *alternative components may be used*. In this indicator, the additional instructions note that operators may have difficulty obtaining network length, in which case route length can be used – but it must be noted on the indicator. The operator should use personal knowledge of the most up to date information available.

Only urban access and connecting service areas are considered, as segregated lanes are highly unlikely in rural areas. Five sub-sets are identified [public transport lanes identified by painted lines or other means, public transport that is physically segregated, e.g. guided busways, high occupancy vehicle lanes, taxi lanes and lorry lanes] and space is available for showing combinations of these sub-sets.

The presence of segregated lanes impacts upon: (i) Reliability [Cluster 5], (ii) customer satisfaction [Cluster 10] and (iii) timetabled operating speed [1.15]. More detailed benchmarking would look at the exact percentage of the total network that has segregated lanes.



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2.13 Segregated lanes for public transport	Percentage of network where public transport is segregated from private cars during peak hours.			
	Place "Yes" in appropriate boxes.			
	If it is not possible to use network length, but route length can be used, indicate in the box below			
	See System Definitions sheet for definition of service areas (urban access, connecting services), network length and route length.			
	Period: Most up to date information available			
	Method: Existing records			
	Operator's personal knowledge			
	Presence of segregated lanes	% of network segregated from car lanes		
		<50%	50-75%	>75%
Urban access:				
Public transport lanes identified by painted lines or other means				
Public transport physically segregated, e.g. guided busways				
High occupancy vehicle lanes				
Taxi lanes				
Lorry lanes				
Combinations of above: please specify in the box below				
Connecting services:				
Public transport lanes identified by painted lines or other means				
Public transport physically segregated, e.g. guided bus ways				
High occupancy vehicle lanes				
Taxi lanes				
Lorry lanes				
Combinations of above: please specify in the box below				
The presence of segregated lanes impacts upon: (i) reliability [Cluster 5], (ii) customer satisfaction [Cluster 10] and (iii) timetabled operating speed [1.15]. More detailed benchmarking would look at the percentage of the total network that has segregated lanes.				

Figure 0.6 Example of an EQUIP Indicator: Segregated Lanes for Public Transport

4.1 Load Factor [Cluster 4, Indicator 1, Asset/Capacity Utilisation]

The load factor (also known as the utilisation/supply ratio) is the ratio of passenger kilometres and/or trips to the quoted maximum capacity (seated plus standing) per vehicle. The criteria for defining the peak and off-peak periods are given and the *operator needs to state the actual times* that have been used, as this may help explain variations in results between or even within operators. [Peak: Monday-Friday (not market day, early closing day or Bank Holiday). Monday is preferable and the hourly maximum number of vehicles within the morning peak should be used. This may be short (2 hours) or long (4 hours) depending upon



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local conditions. Off-peak: the same day is used as for the peak for sampling. It uses the hourly maximum number of vehicles during the morning period which is not peak time.]

The load factor can be calculated for either passenger kilometres or passenger trips, depending upon ease of access to data. However, the implications of the components differ: passenger kilometres is the better measure of the load factor as it is the utilisation of the volume available, whilst passenger trips do not properly show how full the vehicle is.

The choice of period and method used affects how information is dealt with. If the *method* of data collection uses a *sample of at least 1 week*, the results should be grossed up to an annual equivalent so that the date is compatible with that collected on an *annual* basis. This indicator will then be an approximation by the operator. If personal knowledge or existing records are used, the formula that has been given for the load factor [(number of passenger trips or km / vehicle capacity) 100%] will not be used.

The network needs to accommodate peak demand in order to ensure reliability, and customer satisfaction. If the difference between peak and off peak is great, operators face the problem of idle vehicles. The load factor may be affected by seasonality and school holidays [1.12]. If this is the case, repeat surveys in different seasons and during and outside school terms are recommended. Load factor is also connected with Reliability [Cluster 5] and headway.

More detailed benchmarking would consider the details for a number of specific routes within each service area; and would distinguish between overloading of seats and overloading of seats plus standing (if standing is permitted).

7.1 Operating Profit or Loss [Cluster 7, Indicator 1, Company Performance]

Company Performance is measured using existing records for the last financial year and the preceding four years. If the company has been reorganised during the last 5 years, records are only used for the period since reorganisation, in order to retain the compatibility of the data. Information should be available from the company's audited accounts departments.

Contract service data is not usually separable from scheduled service data. In such cases the instructions are that care should be taken to include scheduled and service costs in the total costs, and farebox revenues and contract fees should be included in the total revenues.

This indicator looks at the declared operating profit or loss before tax and interest payments. Total revenue includes payment for concessions and service contracts but excludes non route specific subsidies. Total income includes all revenues and subsidies. Total costs include all vehicle acquisition costs (including leasing, purchase and interest). Profit or loss is the difference between total income and total costs.

The extent to which revenue is expected to exceed costs depends to a large extent upon the operating environment (degree of competition [2.1]) and the resulting availability of subsidies: public subsidy in infrastructure and rolling stock [2.6] and external contributions to



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variable costs [2.9]. Adverse trends in profits, passenger trips (or kilometres) and financial ratios may result from company reorganisation and major capital expenditure.

Cluster 10, Customer Satisfaction, Indicators 10.4 to 10.7

Opinion surveys are the most relevant way of obtaining information about customer satisfaction. The time and method of obtaining data is the same for all passenger opinion surveys. A minimum period of one week must be used for a sample opinion survey. Indicators report the average weighted score from the opinion survey as co-ordinates (see Figure 4.3) based upon the importance for the respondent and the opinion of the performance for each respondent. Reported scores are on a scale of 0 to 4, where 0 is the worst score and 4 is the best. Data from the opinion survey questionnaire is entered in the spreadsheet called Passenger Data. In the electronic version the average weighted scores are automatically calculated and transferred to the relevant indicator.

The indicator 10.4 **On board the vehicle** covers the first 11 questions on the questionnaire looking at issues such as state of repair and cleanliness, standard of driving, space for luggage, pushchairs etc., punctuality of the service and sense of personal security. More detailed analysis would look at the components of these sub-sets, e.g. repair, cleanliness, luggage space, wheelchair space, pushchair space. Customer satisfaction with on board conditions should be viewed in the context of competition with private cars: advances in car design have been much more rapid than those for public transport, which has limited the attraction of public transport for car owners.

Customer satisfaction directly depends on many indicators, e.g. Reliability [Cluster 5] is probably the most important indicator; integration of fares and timetables [1.14 and 2.3]; the presence of segregated vehicle lanes [2.13] affects operating speeds [1.15]; real-time information [1.19]; internet information [1.20]; dedicated parking [2.10]; dedicated bicycle parking [2.11]; fare level [3.2]; type of tickets [3.3]; single/monthly price ratio [3.4], relative price of private and public transport [3.9]; driver training [9.4]; vehicle accessibility [10.3] is important for particular groups of customers (wheelchair and pushchair users); passenger health and safety [11.3]. Improved satisfaction may require improvements in a number of these indicators.



Key Attributes of the EQUIP Handbook

This section summarises the most important features of the EQUIP Handbook.

0.1.15. Methodology

The Handbook is suitable for local public transport operators in diverse operating environments, whether rural, small and regulated or urban, large and subject to competition. It can be used for self-assessment (Level 1 benchmarking) and for comparing with other operators using an anonymous centralised database (Level 2) and is suitable for internal, national and international benchmarking, although the level of application varies according to the individual indicators, e.g. cost related indicators are most suitable for internal and national benchmarking.

The operator can choose the criteria for selecting benchmarking partners by referring to the indicator list and in particular to the first two clusters of indicators.. The relevant criteria will vary according to the circumstances of the operator and the areas that they wish to benchmark.

The definitions of the indicators enable – and emphasise – the collection of compatible data. As shown in the previous section, the Handbook offers guidance in selecting and measuring appropriate data over appropriate periods of time. By specifying the actual date for the measurement period, the operator has a powerful tool for making on-going internal comparisons, as well as explaining unusual differences between companies. Whilst it is preferable for the benchmarking process to use comparable data, it is recognised that institutional and other differences (e.g. size of service area, size of company, type of service area) will give operators different values in different environments. Therefore it is important to be able to *explain* differences in indicator values. For this reason the first two clusters of the EQUIP Handbook (Company Profile and External Influences on the Operator) enable users to identify those factors that could explain differences in operational indicator values.

0.1.16. Ease of Use

There are separate, compatible versions of the Handbook for five different land-based modes, which have been translated into native languages before use by operators. There is a separate Guide to assist users.

Within The Indicators eleven distinctive clusters contain a total of 91 indicators and the indicators are numbered, named and defined. Aids to completion include additional instructions for measurement where required. Indicators are colour-coded and the Common Elements sheet identifies the location of indicators where constituent elements are used more than once in the Handbook. A commentary is added to the indicators which contains cross-references to other relevant indicators in the Handbook and suggests how the indicator could be looked at in greater depth. The data from the opinions surveys are weighted according to its importance to the respondent and how well the respondent considers the operator to be performing.



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In the *paper version* enough space is available for all relevant data to be recorded directly in the Handbook, including the component values as well as the final values. In the *electronic version*, users are informed of the System Definitions at the appropriate indicators. Common Elements data inserted in the electronic version of the Handbook is automatically copied to the relevant indicators and the calculation of all quantitative indicators is automatic. The calculation of weighted averages for opinion surveys of passengers and employees is automatic, as is the transfer of the averages to the relevant indicators.

Operators can start the benchmarking process using 27 “super indicators” (see Table 4.1) selected for their company performance attributes and to enable comparison with appropriate companies. These indicators were chosen because they would help operators select suitable benchmarking partners from the reference database, the data was important to operators for benchmarking their performance, and many were also found to be important in a survey of nine other reports of benchmarking studies.

Recommendations

0.1.17. Format of the Handbook

The Handbook should continue to be available in native languages. The process of translation should be extended beyond those used in EQUIP to include all languages used in the European Community.

The *electronic version* should be available to users, as it supports time saving for the operator through automatic data calculation; accuracy in data calculations; a readily accessible database; further data analysis; and the ability to repeat observations and make comparisons. The *paper version* should be available to users in *colour*, as the colour-coded indicators promote ease of use.

0.1.18. Application of the Handbook for Future Benchmarking Activities

Operators expressed a willingness to participate in benchmarking activities. The workshops were regarded as an opportunity to overcome a sense of isolation when embarking on a new exercise. Indeed, these fora for communication demonstrated the principle of benchmarking at the highest level, i.e. the need for face-to-face discussions. For lower level benchmarking it was clear that operators would benefit from an established **external help-line mechanism** to assist with completing the Handbook.

Lack of confidence in the completed data set manifests itself in a number of ways. Companies may make excuses for poor performance by suggesting that it is not possible to compare with other operators. Experience shows that once this problem is overcome, excuses lessen and plans for improvement are made (Trans Control, 2000)¹⁰. More basically,

¹⁰ Rönqvist, T. and Keskitalo, J. (2000) Report on the EQUIP Draft Handbook (Confidential). Trans Control, Finland.



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companies recognise that there is a lack of knowledge in benchmarking and that education and support is needed. Training should not only be for the decision makers in higher management, but also for those responsible for carrying out the data collection.

The greatest problem facing operators in the EQUIP Network was the **lack of resource** – time and manpower – to establish the necessary systems to collect and record data for the Handbook. This issue was present in all types of company, whether large or small, privately or publicly owned.

The impetus for assisting the companies could come from several institutional sources, e.g. support from national governments, support from national and international organisations that represent the interests of public transport operators, and support internally from decision makers within the organisation. The lack of manpower resource could be resolved by the external completion of the Handbook. Whilst the Handbook is designed to enable self-assessment, i.e. it contains all the information that an operator should require in order to complete the Handbook, this does not preclude an external agency carrying out the task. The assistance could cover some or all aspects of the Handbook, i.e. access to internal systems, opinion surveys, on-road and off-road technical surveys.

Lack of resource also related to operator involvement in pre-existing benchmarking activities, e.g. in Finland and Italy. Whilst the objectives of these activities differed from EQUIP, operators faced problems in collecting two sets of data: even indicators with the same title may not have had the same definition and sampling criteria. The temptation to “misuse” data is – understandably – high. In order for benchmarking activities to progress, it is clear that agreed standards need to be established and adhered to. The practicalities of maintaining these standards means that external support would again be advisable.

Operators faced the problem of incomplete data sets: it is recommended that users of the Handbook are encouraged to complete as many indicators as possible in order to maximise the benefit from the Handbook, since access to data from other companies is restricted to those indicators to which input has been made. Clearly, the solutions of increased resource and support would help to overcome this problem.

Although operators were keen to comment and discuss the content of the Handbook, there was a reluctance to invest resources in a pilot project, since it was known that the final Handbook would be substantially different from earlier versions. This should be regarded as a short-term problem – but the wealth of information that has been assembled in the EQUIP project should be capitalised upon by moving forward with the EQUIP Handbook rather than returning to the starting point again with non follow-on projects.

The EQUIP Handbook was intended to provide an overview of performance measures for local public transport operators. Future development of the EQUIP Handbook should address the specific circumstances of more **targeted benchmarking groups**, e.g. operators of rural, Demand Responsive Transport and special transport service. Such groups should be established at national and international levels.



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In addition to new benchmarking groups, the existing **EQUIP Network** should be supported to enable its retention and extension, thereby providing continuity of input of feedback and output of data. The EQUIP project demonstrated the importance of the Network as a means of supporting companies, particularly small ones which would otherwise be working in isolation.

Throughout Europe there is a trend towards greater privatisation and more competition for public transport services. This is reflected by rapid **changes in the character of companies**. During the course of EQUIP there were numerous instances of company reorganisation in the private sector. Such activities may be seen as initial obstacles to benchmarking, e.g. company accounts and other data may be reorganised, making it difficult to access relevant data, and to make internal comparisons over a period of time. However, reorganisation could be regarded as an opportunity to introduce new systems such as those required for benchmarking.

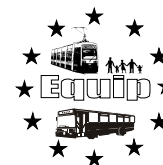
Cost related indicators present **difficulties of comparison** at the European level and it is particularly difficult to compare companies from different operational and economical environments. This is a very important issue for international benchmarking. However, evidence suggests that many difficulties are perceived rather than actual (Trans Control, 2000).

The **confidentiality** of financial and other delicate information is very important and must be guaranteed. All confidential information placed on a public database must be in an anonymous format. Measures should be taken to overcome perceptions and problems relating to confidentiality, particularly where competition is strong.

The remit of the EQUIP project was to develop a self-assessment Handbook for Level 1 benchmarking. EQUIP has prepared for Level 2 benchmarking by establishing a database against which operators can make anonymous comparisons. The continuation of such benchmarking requires **stability** within the Network covering the areas of administration, methodology and data analysis – and the commitment to benchmarking over a reasonable period of time (at least 3 years).

The Handbook has begun the cyclical process by allowing operators to identify areas that need improvement – the next stage is to develop the **methodology that will enable the improvements to take place**, thereby achieving the real objective of improved competitiveness. This would cover organisational issues, e.g. the separation of man power between the identifiers of the areas for improvement and those who plan to make it happen (Trans Control, 2000). However, this is only the beginning of benchmarking and there is also the need to develop the EQUIP Handbook in order to permit **full direct benchmarking** (Level 3) between companies.

The development of more advanced benchmarking encompasses greater administrative problems than with Level 1 benchmarking. For example, a **trusted holder of a database**



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and the Handbook is needed: this may be a different entity to one analysing the data for network members.

From the experience of the EQUIP project, the basic requirements for a **successful benchmarking exercise** in public transport include:

- **Motivation** of the operators to put effort into participating in the process. There should be evident benefits that are easily available and noticeable from the use of the tool.
- Clear definition of how **the benchmarking process** should be accomplished as a self-assessment process.
- Clear definition and ways of calculating **values of the indicators** that measure the performance of the operator.

The EQUIP project has addressed these issues and has demonstrated that operators can achieve an improvement in performance through on going self-assessment; and by comparison with other operators using a reference database. The practical exercise has raised the awareness of critical success factors for operators and the need to learn from best practice in order to improve competitiveness.

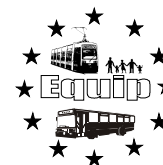
Dissemination and Awareness Raising

The Activities

Awareness raising and dissemination activities were given a high profile in the EQUIP project. Firstly, the objectives of the **awareness raising activities** databases, and liaison/external activities were to take a proactive role in dissemination. This involved the identification of the sectors who needed to be aware of the benchmarking activities and the key agencies and actors with which EQUIP needed to have active links. This was followed by the development of an awareness raising plan; the initiation and carrying out of activities which increased awareness of the internal quality performance indicators and benchmarking techniques among the target audience. A publicly accessible database of benchmarking results was created and it was ensured that the database was accessible to target audiences; this provide and interface between EQUIP and other interested parties.

Secondly, the objectives of **dissemination and exploitation activities** were to initiate wide publicity for the Handbook and the database; establish the dissemination of the results for the public transport operators to use and for the information of transport co-ordinator and/ or local authorities; and to establish the dissemination of the results for a wider community than those directly interested and concerned with the topic of the project. It was also necessary to ensure that the project was exploited to its full potential; and that mechanisms for providing feedback of the results from the EQUIP Handbook and materials to provide a practical experience and knowledge base were explored.

Category	CHANNEL
Direct	<ul style="list-style-type: none">• Mail• Telephone



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	<ul style="list-style-type: none"> • e-mail
Indirect	<ul style="list-style-type: none"> • Journals • Trade Press • Newspapers • CORDIS and other EU dissemination media
Face-to-face	<ul style="list-style-type: none"> • Events • National and International Workshops • External Conferences • Meetings
Through “Influencers”	<ul style="list-style-type: none"> • Network newsletters • UITP • National associations • DG TREN Officers and work programme
Responsive	<ul style="list-style-type: none"> • Interactive Website

Table 0.1 Channels for dissemination of EQUIP information and outputs

Since there was a very strong inter-relationship between these activities, they have been reported together. Deliverable D2, *Awareness Raising, Publicity and Dissemination Plans*, published in June 1999, established an Implementation Plan which gave a set of actions to be completed during the lifecycle of the project and this led to the creation of the EQUIP Website (<http://www.europrojects.ie/equip>), two newsletters, two rounds of national workshops and one international workshop in Vienna. Most of the awareness raising and publicity activities were on-going, but some have naturally extended beyond the project life such as participation in conferences, submission to journals and Website maintenance.

A wide range of channels (Table 5.1 above) were considered for dissemination. There were significant differences between the Consortium member’s in how the different channels were used. Overall, personal contact in the native language between the individual partners of the Consortium and the different target groups was the most efficient and this led to an EQUIP policy note on the use of language.

Key Dissemination and Awareness Raising Actions

0.1.19. The EQUIP Website

The EQUIP Website address is <http://www.europrojects.ie/equip>. The website has introductory information relating to benchmarking. It also includes information about the project as well as containing links to EQUIP deliverables and other publicly available information. A link to ELTIS was also included.

0.1.20. The EQUIP Brochure and Newsletter

In the first stage of the project a brochure of the EQUIP project was produced. This was the first external action of the EQUIP Consortium to the identified target groups. This brochure included information on the background of the EQUIP project, a brief overview of the



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objectives and methodology and a contact list of the partners involved in EQUIP. The brochure has been distributed via a diversity of channels, e.g. a mailing list, individual contacts of the EQUIP partners on a national basis and on request.

In February 2000 the EQUIP Newsletter was produced. This newsletter provided detailed information about the methodology of EQUIP and an announcement of the International Workshop in Vienna.

These have led to the creation of a European wide contact list containing in excess of 1400 operator and authority addresses, telephone numbers and e-mail addresses.

0.1.21. The EQUIP International Workshop

On 6-7th June 2000 an international workshop was organised in Vienna. The workshop was announced in the EQUIP Newsletter, on the EQUIP Website and in bilateral contacts between the partners of the EQUIP Consortium and the members of the Network. The workshop was hosted by Universität für Bodenkultur, and had speakers were from the European Commission, the UITP and representatives from the EQUIP Network. The programme was sub-divided into four main areas: the role of benchmarking in passenger transport; the EQUIP benchmarking tool; the efficiency gains that can be achieved; and the formalisation of benchmarking, including the role of EQUIP in this.

0.1.22. Conferences, Publications and Workshops

In line with the objectives of the EQUIP project, wide publicity was given to the Handbook. Progress is reported in Chapter 3. A number of initiatives have been made in order to realise scientific publications so as to give wider attention to the EQUIP methodology via scientific fora.. The EQUIP project has targeted certain publications during the year 2000 - and will continue after the lifetime of the project - presenting the EQUIP approach and output, as well as the benefits which are anticipated from the benchmarking of internal efficiency indicators in passenger transport.

Based on the research, analysis, and outputs of EQUIP, articles will be offered which meet the high standards required for professional publication. The publications will consist of transport domain journals and periodicals which reach the various EQUIP target audiences. Known publications at the end of the EQUIP funding are shown in Appendix 3.

Conclusions and Recommendations

Background

It was originally envisaged that the EQUIP Handbook would become a powerful public tool utilised by a well-established network that would generate good quality data. It was also hoped that a potential sponsor such as the UITP would welcome the initiative and support the development of the process. In the light of demand from the industry it was expected that the Consortium would generate further initiatives. The reality is a little different. The Handbook



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has been created and is a good product, but the UITP has not been in a position to take ownership of the products and no active proposal is in place. Additionally, few operators have yet committed the resource necessary to generate data of a suitably high quality. There is interest by operators in benchmarking and the value of networking has been established.

The main challenge which remains is to mobilise the industry to embrace benchmarking. For operators proposing to take benchmarking seriously there are still many unanswered questions: what resources will they need to commit, to what extent are they interested in continuous improvement, how can they make benchmarking part of their business, who will champion the initiatives required? This chapter produces a possible approach towards the institutionalisation of benchmarking. The UITP is identified as a possible common access point to international benchmarking for local public transport operators and as the co-ordinator of National Associations who in turn could be responsible for National Networks.

Towards the Institutionalisation of Benchmarking

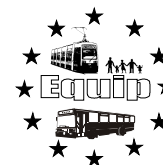
One of the clear outcomes of the EQUIP project is the necessity to move towards the institutionalisation of the benchmarking process. It is clear that effective benchmarking must be a permanent process in order to increase quality and competition in the public transport sector. Similarly, a permanent process needs an institutionalised framework with clear responsibilities for managing the benchmarking exercise.

A number of products from the EQUIP project strengthen the argument for institutionalising the process:

- The EQUIP project has created a list of standardised indicators to measure technical performance and quality of output together with a documented methodology;
- The collection of data commences the reference database and it is essential that the expansion of the database should take place based on standardised and comparable indicators; and
- The results can be used to benchmark dynamic changes and to support the tendering process.

The EQUIP project has put forward the following suggestions for reaching the goal of institutionalisation:

- It is essential that the Handbook is translated into the relevant national languages.
- There should be a Manager of both the database and the Handbook who is responsible for both regular maintenance and updating and who could not benefit from having access to the data;
- The collection of data should be carefully organised by operators, perhaps via membership of a benchmarking club or a network (see Chapter 3), or by a commercial body.
- The analysis of data should also be formalised via the mechanisms mentioned above.
- Responsibility for the benchmarking exercise should lie with the operators who need to bear the responsibility for the cost of improvements. Management of the database should



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lie in the public sector, or with members of a benchmarking club or network. This is because cost responsibility is a critical issue.

Scenario		Advantages	Disadvantages
1	International Interest Group	<ul style="list-style-type: none"> Standardised data collection on an international level Easy access to the database for public transport operators Low cost for benchmarking exercise 	<ul style="list-style-type: none"> Data collection must be done by operators themselves
2	One private company at international level	<ul style="list-style-type: none"> Indicators and Handbook will be developed further Very convenient for public transport operators Professional management 	<ul style="list-style-type: none"> Operators have to pay for a commercial service The company could be a monopoly
3	National associations (e.g. chamber of commerce, quality groups, public transport consortia)	<ul style="list-style-type: none"> Easy access to the database for public transport operators Low cost for benchmarking exercise 	<ul style="list-style-type: none"> If indicators are developed further they are no longer comparable at an international level Data collection must be done by operators themselves Low resources
4	Several private companies on national level	<ul style="list-style-type: none"> Developing tailor-made indicators for clients Very convenient for public transport operators Professional management 	<ul style="list-style-type: none"> The indicators are no longer comparable at an international level Operators have to pay for a commercial service
5	A mixture of private companies and interest groups	<ul style="list-style-type: none"> Combine the advantages of both alternatives Data collection and analyses are carried out by the private sector Good access for operators, the interest group can change their partners in the private sector if it is worthwhile to do so 	<ul style="list-style-type: none"> Distribution of responsibilities

Table 0.1 Possible Scenarios for the Institutionalisation of Benchmarking

However, institutionalisation is not straightforward and five scenarios have been identified as possible models for providing the very important networking processes required for the successful institutionalising of benchmarking. These are shown above in Table 6.1.

It is recognised that international comparisons using EQUIP should follow soon after the project is completed since any significant gap in time will lead to different indicators being pursued in different areas. An international public transport association or interest group is ideally placed to make the information available to its members but cannot focus on the full



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spectrum of operators within a country because of membership limitations. It is only the national associations who have the membership base and therefore the ability to create extensive networks at a national level. *EQUIP therefore recommends Scenario 3.*

Developing a Benchmarking Network

The development of a successful network of operators and authorities is part of the institutionalisation of benchmarking. The EQUIP international Network has brought together operators, authorities, user groups and representatives of users. The Network has been successful in supporting the development of the Handbook, for example in commenting on the layout of the Handbook, providing feedback on indicators and in piloting the Handbook.

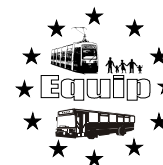
Various lessons have been learnt from the experience of the EQUIP Network. Mutual support in benchmarking is extremely valuable, as it is important for operators (especially small ones) that they do not work in isolation. Language can be a most serious impediment to benchmarking and so native languages, using the correct technical language, must be used for effective benchmarking. It has been shown that formal networks generate informal networks and that this sometimes creates new business opportunities as well as new business contacts. The importance of an independent trusted party as the holder of the data has been firmly established.

The Way Forward

What should happen next? There is a clear need for the formalisation of the benchmarking process, as discussed in Sections 6.2 and 6.3 above. It is clear that successful Networks need not necessarily know any geographical boundaries and indeed the existing Metro benchmarking clubs are truly global in scope. It is believed that the national associations referred to in Scenario 3 are the key to the formation of such Networks but this would still require, initially, some “umbrella” organisation to bring national associations together. There is some urgency surrounding the next steps: a significant gap in time is likely to lose the impetus created by EQUIP. Perhaps more importantly and more significantly, elapsed time allows variations in indicator sets to be developed in different countries thus losing the international comparability offered by use of the EQUIP Handbook.

EQUIP identified a number of necessary conditions for reaching the goal of institutionalisation. The Handbook must be available in the relevant national language. The database, data analysis and the Handbook must be managed so that they are up to date and this must be carried out by a manager who must not benefit from having access to the data. Finally, responsibility for the benchmarking exercise must lie with the operators, who need to bear the responsibility for the cost of improvements.

A future strategy which makes use of National Associations to carry forward the benchmarking process has been presented. It is recommended that the Associations are



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brought together with a view to agreeing to harmonise their benchmarking activities over a five year period. As a trans-national entry point, the super indicators set developed in EQUIP could be implemented. Operators could be encouraged to develop their data sets over time with training and support provided by these Associations thus recognising that true value added is only realised by achieving real improvements. Over time the National Associations could interact with each other, possibly using the UITP as a common access point, thus providing the start of international benchmarking. *As a matter of urgency, the Commission for the European Community is urged to fund a Workshop of National Associations* and the EQUIP Consortium will propose an “umbrella” structure to co-ordinate the activities of the Associations.

Bibliography and References

Deliverable D2, *Awareness Raising, Publicity and Dissemination Plans*. EQUIP Consortium

Deliverable D3, *State-of-the-Art in Benchmarking of Quality of Public Transport*. EQUIP Consortium

Deliverable D4, *The Benchmarking Handbook*. EQUIP Consortium

Abbreviations

Abbreviation	Description
CEC	Commission for the European Community
CEN	European Committee for Standardisation
ELTIS	European Local Transport Information Service
ISOTOPE	Improved Structure and Organisation for Transport Operations of Passengers in Europe
QUATTRO	Quality Approach in Tendering Urban Public Transport Operations
UITP	International Union of Public Transport



APPENDIX 1: THE EQUIP BENCHMARKING HANDBOOK

Indicators are provided for the full version of the bus mode and the shortened (super) version of the tram mode.

These, and indicators for all other modes, including the electronic versions which have automatic calculation built into the spreadsheet are available from Corinne Mulley, the Project Co-ordinator, by e-mail (Corinne.Mulley@ncl.ac.uk).



The EQUIP Handbook for the self-assessment of the performance of local public transport services





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This file gives instructions for choosing, installing and completing the EQUIP Handbook files for benchmarking the internal efficiency of the local transport operator.

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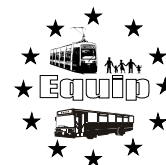
2. System requirements
3. How to set up a computer for a single mode operator completing a single Handbook
4. How to set up a computer for multi-modal operators or a single mode operator completing more than one Handbook
5. Opening the indicator files
6. Adding data to the Indicators file

FOR USERS OF THE PAPER VERSION OF THE HANDBOOK

7. Preparing the files
8. Adding data to Part II: Indicators

1. File names and contents

File name	File contents
Method_fin.doc	Part I: The Method
Guide_fin.doc	Part II: The Indicators: Guide to Completion of the Handbook
	<i>The following files contain the indicators for each mode:</i>
Bus_elec.xls	Electronic version: Bus except trolley bus
Tly_elec.xls	Trolley bus
Trm_elec.xls	Tram/light rail
Met_elec.xls	Metro
Hvy_elec.xls	Local heavy rail
SuBus_el.xls	Electronic version of Super Indicators: Bus except trolley bus
SuTly_el.xls	Trolley bus
SuTrm_el.xls	Tram/light rail
SuMet_el.xls	Metro
SuHvy_el.xls	Local heavy rail
Bus_papr.xls	Paper version: Bus except trolley bus
Tly_papr.xls	Trolley bus
Trm_papr.xls	Tram/light rail
Met_papr.xls	Metro
Hvy_papr.xls	Local heavy rail
SuBus_pr.xls	Paper version of Super Indicators: Bus except trolley bus
SuTly_pr.xls	Trolley bus
SuTrm_pr.xls	Tram/light rail
SuMet_pr.xls	Metro



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SuHvy_pr.xls	Local heavy rail
	<i>The following files are used to calculate the average weighted scores for opinion surveys:</i>
OpnEl.xls	Electronic version (full and super indicators)
OpnPr.xls	Paper version (full and super indicators)

FOR USERS OF THE ELECTRONIC VERSION OF THE HANDBOOK

2. System requirements

These files are suitable for use with Windows 98 operating system on a PC using Office 97 versions of Microsoft Word and Microsoft Excel.

3. How to set up a computer for a single mode operator completing a single Handbook

Each mode requires a separate folder for each version of the Handbook to store the files in.

To create a new folder, open Windows Explorer. From the "File" pull down menu, select "new" and then "folder". Name this folder "EQUIP".

Save the Method (Method_fin.doc), the Guide (Guide_fin.doc), the Opinion Survey File (OpnEl.xls) and the appropriate electronic version of the indicators to this folder.

4. How to set up a computer for multi-modal operators or a single mode operator completing more than one Handbook

In the folder called "EQUIP", save the Method (Method_fin.doc) and the Guide (Guide_fin.doc).

Operators of more than one mode or a single operator who intends to start with the Super Indicators and perhaps progress to the full set, need to have a SEPARATE sub-folder for each mode/handbook completed.

To create a sub folder, open Windows Explorer. Highlight the folder "EQUIP". From the "File" pull down menu, select "new" and then "folder". Name this sub-folder for the mode e.g. "Tram" or "Bus_super".

Save a copy of the Opinion Survey File (OpnEl.xls) to EACH sub-folder. Add to each sub-folder the appropriate electronic version of the indicators.



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As there are five different modes, each with the possibility of a full set or set of super indicators, there is a MAXIMUM of 10 possible folders.

5. Opening the indicator files

Always open the files from Windows Explorer.

First open the opinion survey file [OpnEl.xls] from the folder/sub-folder for the mode being considered.

Next open the Indicators file. When opening this Indicators file, there is a choice of whether to update information from another file [OpnEl.xls] or not.

The FIRST time that the file is opened, choose NO as no data has been entered yet.

On subsequent occasions, if the data entered into the opinion survey file [OpnEl.xls] has changed since the Indicators file has been saved, choose YES.

It is important that the opinion survey file from the same folder/sub-folder is used.

6. Adding data to the Indicators file

You will find that you are only permitted to add data to certain cells. This is to ensure that the automatic calculation is protected from change and that indicators are calculated on a consistent basis. If you have problems with this, please contact Corinne Mulley on Corinne.Mulley@ncl.ac.uk.

First enter all necessary opinion survey data in the [OpnEl.xls] data file. This will automatically calculate statistics and copy these to the relevant indicators in Cluster 9 (Employee Satisfaction) and Cluster 10 (Customer Satisfaction) when the indicators file is opened (see 5. above).

Next enter data in the Common Elements section. In the Indicators file, locate the common elements tab at the bottom of screen. Enter all this data and this is automatically copied to the rest of the Indicators file where it is needed.

Then complete the rest of the Handbook beginning with Cluster 1. Each Cluster is on a separate tab. As you scroll down the screen you will see that figures from the Common Elements sheet are already there. You will find that the final values for some indicators will be calculated automatically, but data will have to be entered for others. Proceed with each section (or part thereof) as you acquire data. There is no need to complete the indicators in any order (other than to complete the Common Elements sheet first).

Do NOT worry about error messages (such as DIV/0): these will be replaced with numbers once all parts of the data have been entered.



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You may find having a paper version of the Handbook convenient to use as a reference guide to the data required.

FOR USERS OF THE PAPER VERSION OF THE HANDBOOK

7. Preparing the files

Users wishing to complete a manual copy of the Handbook will either:

- a) receive a copy of the Handbook that has already been printed or
- b) receive an electronic copy which will need to be printed prior to completion.

In the case of a), it is recommended that a blank copy of the Handbook is always kept so that it can be photocopied and used for repeat sets of data at a later date.

In the case of b), print a copy of each version that is required and a copy of the opinion survey file [OpnEl.xls] for each version. Use files ending with _papr.xls and _pr.xls as shown in the table in 1. above.

8. Adding data to Part II: Indicators

The Common Elements section is completed first. It is recommended that this section is kept as a loose sheet of paper or thin card, so that it is readily accessible whilst completing the indicators.

Complete Cluster 1 (Company Profile) first, using the Common Elements data as required.

Calculate the final values where required. Continue with the next cluster. Proceed with each section (or part thereof) as you acquire data. There is no need to complete the indicators in any order (other than the Common Elements first).

Cluster 9 (Employee Satisfaction) and Cluster10 (Customer Satisfaction) are treated differently. For these clusters, data must first be entered from the opinion surveys into the OpnPr.xls file. The weighted averages must be calculated as described in the Guide to Completion. The final values can then be entered into Clusters 9 and 10.

The EQUIP Handbook for the self-assessment of the performance of local public transport services



Part I: Method



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Rationale for the equip benchmarking handbook

The EQUIP Project

EQUIP was a DG TREN funded project which was designed to strengthen the role of the land-based operator in improving the quality of local public transport services through the development of a self-assessment Handbook for benchmarking quality. It started work in January 1999 and was completed in June 2000.

Benchmarking is the structured sharing of data, information, ideas and methods for mutual benefit amongst groups. It is used as a tool to *identify* opportunities for improvement by comparing relevant performance indicators.

EQUIP concentrated on developing a set of indicators to assess the internal performance and service quality of public transport operators without the involvement of an outside agency. Comparing these indicators or benchmarking can help identify where improvements to quality from improvements in the operator's internal performance could be made. The EQUIP Handbook is designed to increase self-knowledge for the operator, increase their competitiveness and make a contribution to the generation of sustainable and stable transport services.

The EQUIP Consortium consisted of a powerful combination of researchers and practitioners from the United Kingdom, Finland, Italy, Austria, Ireland and the Netherlands, supported by the Network of operators and users. The EQUIP Network comprised operators who wanted to share their in-depth expertise with the project on the one hand and, on the other hand, take part in the piloting of the Handbook. The operators therefore informed EQUIP in a practical way, thus ensuring that the Handbook was relevant to its target audience. The EQUIP Network also included representatives of public transport 'users' and national representatives of local authorities and important user groups.

The EQUIP Handbook consists of two parts:

- » Part I describes the method of the benchmarking process. This provides more detailed information and the context for Part II. The person completing the Handbook does not necessarily need to use this Part whilst completing the Handbook.
- » Part II contains a guide to completing the indicators and a full list of indicators together with their definitions, recommended methods of data collection and a commentary on the indicators. The indicators are in a format that is ready to be completed by the operator.

Who is the Handbook for?

The EQUIP Handbook is to be used by operators of the most frequently used modes of land-based public transport. This includes bus, trolley bus, tram, Metro/light rail and local heavy rail operators. It excludes air and water transport (water buses and ferries) and less common land-based transport (cable cars and funicular railways): a number of different indicators would need to be measured in order to benchmark these groups.

The Handbook is suitable for different types of operator, e.g. small, medium large, urban, rural, inter urban. The EQUIP approach to benchmarking with such diverse entities is discussed in Section 1.5.

Within a company the decision to carry out benchmarking will lie with senior managers. After this, the completion of the Handbook will depend upon lower level persons. The exact allocation of responsibilities will relate to company structure and size. These issues are addressed in greater detail in Section 2.2.



Operators can use the Handbook to measure their own operational performance over time. Members of the EQUIP Network wanted to extend their comparison of performance to other operators within the same or other European countries. Therefore, the Handbook was circulated to members of the EQUIP Network, for which all members signed a confidentiality agreement.

Why is the Handbook necessary?

The Handbook enables operators to make like-for-like comparisons with other operators. Benchmarking may be initiated because:

- the company is not satisfied with one or more particular areas of company performance;
- the company wishes to improve its overall competitiveness in relation to other companies.

Operators may be aware of how they perform, but measurements are often made in many ways so that they cannot make comparisons with others if they wished. Furthermore, the larger the company, the more important it is to have in-depth measurement of performance, as it is less likely that management will have daily contact with operations. Conversely, in small companies, management will have more detailed knowledge of operations and would be able to assess performance to a certain degree – but it would not be objective data. For this reason, a selection of base indicators should still be collected. The EQUIP Handbook addresses these issues and enables meaningful comparisons to be made.

What is Benchmarking?

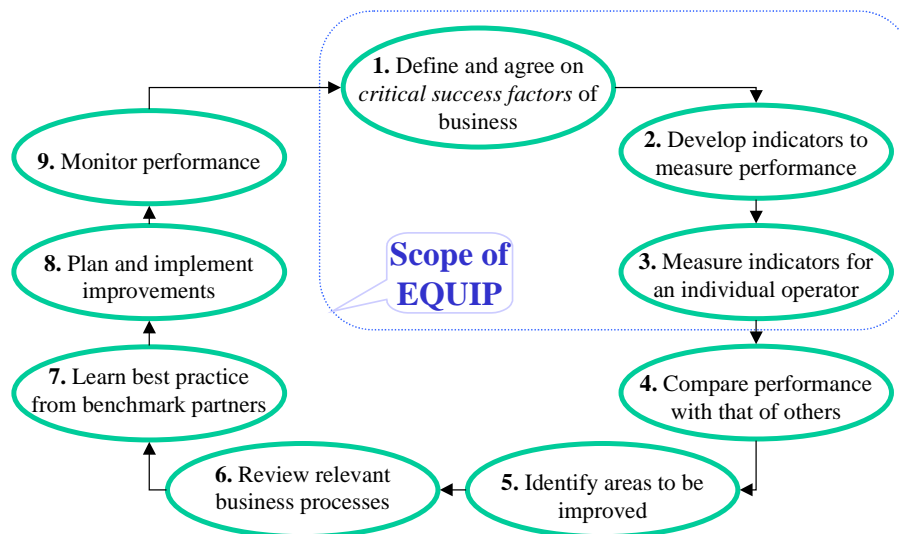


Figure 0.1 The Cyclical Process of Benchmarking

Benchmarking is a cyclical process (see Figure 1.1) in which one complete cycle of benchmarking involves nine stages. The process commences with the definition and agreement of the factors which are critical to the success of an individual company (**stage 1.**). This is followed by the development of appropriate performance measures (known as indicators) (**stage 2.**). These indicators are then measured by individual operators (**stage 3.**).

Benchmarking enables an operator to compare indicators with other operators (**stage 4.**), so that areas of relative strength and weakness can be determined (**stage 5.**). Having reviewed all relevant business processes, individual operators can decide the operational aspects which would be commercially valuable to improve (**stage 6.**). At this stage there are two possibilities. Operators could *compare* the company with appropriate sections of a *centralised database*. In Chapter 2 this is described as Level 2 benchmarking. There is still no direct contact with other companies at Level



2. The advantage of comparing internal results with the database is to allow better identification of the performance areas needing improvement and the current “best” standard to aim for.

Alternatively, the company could apply to a benchmarking network for potential benchmarking partners in these areas. The network is composed of a number of operators who have agreed to share their results with each other, with the intention of benchmarking to their mutual benefit. In this case an operator will work with at least one other partner who has(have) been identified as being relatively good in the selected areas of operation (**stage 7.**). The operator is then able to plan and implement improvements to the business (**stage 8.**).

Benchmarking is a **permanent, on-going process**: having implemented improvements, the indicators need to be monitored (**stage 9.**). Furthermore, since the business is not static, the operator will need to review all indicators periodically, which will require starting once again with a review of the critical success factors for the business (**stage 1.**).

At its most effective each benchmarking partnership is intended to provide benefits and improved performance to all partners and must be conducted with strict confidentiality. However, benchmarking is still useful if an operator works independently from other companies.

The EQUIP Handbook is concerned with the development of the **first three stages** of benchmarking.

For operators who continue with the **later stages of benchmarking**, the EQUIP Handbook offers the opportunity to compare performance with companies operating in the same and different areas of competition. These areas of competition may relate to the degree of regulatory control, the type of service area covered by the company and the modal types used by the company. Should a company feel unable to benchmark with competitors (potential or actual), benchmarking will be restricted after stage 3.; the company may proceed with internal benchmarking by planning and implementing improvements (stage 8.) followed by repeat measurements over time (stage 9.). In this case, stage 8. will not benefit from external inputs (stages 4. to 7.).

Frequently asked questions

What if.....

.....partners are competitors, either actual or potential?

- Normally, benchmarking takes place between non-competing companies.
- Comparisons are sometimes made between companies in different industries.
- Benchmarking partnerships require the full consent of all the partners.
- Confidentiality must always be ensured.

.....partners have different regulatory and funding systems?

- In many cases this may not be as large a barrier as anticipated, due to the design of the Handbook.
- Where different systems affect the performance of a company, a centralised database of combined results from all the companies using the Handbook would be subdivided appropriately. This enables operators to be selective in their choice of benchmarking partners.

.....partners are different types of operator?



There are various parameters describing a company, e.g. large or small; fixed or flexible service lines; urban, inter urban or rural services. The Handbook recognises these differences and asks each operator to describe its company profile, so that reasonable and relevant comparisons can be made between operators.

- In some cases companies can be compared easily as they have a similar profile.
- Where certain differences in company profiles are usually important, the database is subdivided so that appropriate indicators can be compared.
- A number of indicators describe the attributes of a company. The company can then choose which attributes it wishes to be the same as other companies for benchmarking purposes. This allows flexibility in benchmarking, e.g. since policies and targets change over a period of time the company can change the choice of attributes, and therefore benchmarking partners, accordingly.
- It is recognised that in some cases costs are difficult to compare, e.g. if an operator
 - » provides non-public transport services such as water and power utilities;
 - » supplies a mixture of public transport services covering different types of area and different modes;
 - » has subcontractor(s) for some or all services.

Nonetheless, there will still be quite a large number of indicators which can be compared sensibly.

If an operator finds it very difficult to measure some indicators and decides to leave these out, these will not invalidate the comparisons that are made.

The EQUIP Handbook Indicator Clusters

The EQUIP Handbook uses over 100 indicators, which are grouped into 11 clusters. These clusters describe the internal and external status of a company. Chapter 6 describes the rationale for the clusters and their suitability for benchmarking.

The EQUIP Handbook clusters are:

- 1. COMPANY PROFILE**
- 2. EXTERNAL INFLUENCES ON OPERATOR**
- 3. REVENUE AND FARE STRUCTURE**
- 4. ASSET/CAPACITY UTILISATION**
- 5. RELIABILITY**
- 6. PRODUCTION COSTS**
- 7. COMPANY PERFORMANCE**
- 8. TECHNICAL PERFORMANCE**
- 9. EMPLOYEE SATISFACTION**
- 10. CUSTOMER SATISFACTION**
- 11. SAFETY AND SECURITY.**



HOW TO USE THE HANDBOOK FOR IMPROVEMENT

Different Levels of use

In general, the more an operator progresses up the levels described below, the greater the benefits that can be achieved. Whilst a company can work independently at Level 1, progress beyond Level 2 will depend upon finding a compatible partner or partners with whom to work in order to obtain the full benefits of benchmarking.

Level 1

The EQUIP Handbook is designed to enable an operator to carry out self-assessment. ***Results need not be shared outside the company.***

On the basis of the indicator measurements, the company decides which areas of performance need improvement. Performance Improvement Teams (PITs) can be established in order to do this (see Section 2.2).

Internal benchmarking is achieved by taking repeat measurements of the indicators over a period of time; this enables the company to monitor progress. In order to make valid judgements about change over time, it is important that data is collected in a consistent manner each time self-assessment takes place.

Level 2

The data collected in Level 1 is used to ***compare*** the company with appropriate sections of a ***centralised database***. There is still no direct contact with other companies at Level 2. EQUIP used the data from the EQUIP Network pilot of this Handbook to put data into a centralised database in a form that was anonymous to the Network members. After EQUIP finished in June 2000, this database remained available for the continuation of Level 2 benchmarking.

The advantage of comparing internal results with the database is to allow better identification of the performance areas needing improvement and the current “best” standard to aim for.

Again, this work can be carried out by PITs.

The comparison of the company’s indicators with the database is repeated over an appropriate period of time, usually annually. This enables the company to monitor performance against the on-going performance of other companies in the database. As with Level 1 benchmarking it is important that data collection is consistent; it is also necessary to ensure that data collection adheres to the techniques identified in a benchmarking guide, otherwise comparison with reference data will not be meaningful (this also applies to Level 3 benchmarking).

Level 3

Having established performance areas in which the company performs well and those areas that need improvement, the company applies a benchmarking network for potential benchmarking



partners in these areas. The network is composed of a number of operators who have agreed to share their results with each other, with the intention of benchmarking to their mutual benefit.

Participation in full benchmarking is a *two-way process* and must benefit each partner, i.e. within a benchmarking group a company offers its good areas for benchmarking as well as seeking partners to assist with its poor areas. Some companies may wish to establish benchmarking relationships with more than one other operator. EQUIP did not carry out the Level 3 process: there are examples from other industries where brokers exist to match people/companies confidentially. Within the public transport sector, Metro benchmarking groups do exist and it was hoped that one outcome of EQUIP would be the development of groups that would lead to full benchmarking for local public transport.

Once terms and conditions (see Section 2.3) have been agreed between partners, *personal contact* should be established between people in the relevant parts of the company, who may be members of a PIT. *Discussion* of current practices and equipment may identify very quickly how improvements can be made.

Once a good working relationship has been established between benchmarking partners, they may wish to continue benchmarking beyond the point where the initial areas for collaboration have been substantially improved.

All Levels

However, it is likely that it will be necessary to make *further measurements* in the performance areas to be improved and some potential indicators for this are mentioned in the EQUIP Handbook. On going monitoring of these additional performance measurements will continue in parallel with regular updates of all the Handbook indicators, in order to check whether improvements in some areas within a company have a detrimental effect on others.

Figure 2.1 summarises the benchmarking process described in this section.

Performance Improvement Teams

0.1.23. Starting a Performance Improvement Team within the Company

It was noted in Section 1.2 that the decision to carry out benchmarking will lie with senior management, but it is likely to be organised and carried out by lower level managers, unless the company is small.

It is possible for one or more *individuals* to be given the task of making improvements.

However, it is generally found that *teams of experts* are much more likely to succeed. Clearly, the composition of the PITs should reflect the areas of improvement under consideration. These experts may include or largely consist of drivers, maintenance staff and other staff with direct responsibility for and experience of operations, together with managers at different levels within the company. Between them, they will have an interest and expertise in the full set of indicators.

A person at a *senior level* within the company will have the following role:



- decide the initial objectives in the benchmarking process;
- decide the composition of the PIT; and
- if more than one area is to be improved, this person will justify the prioritisation of objectives on commercial or other grounds.

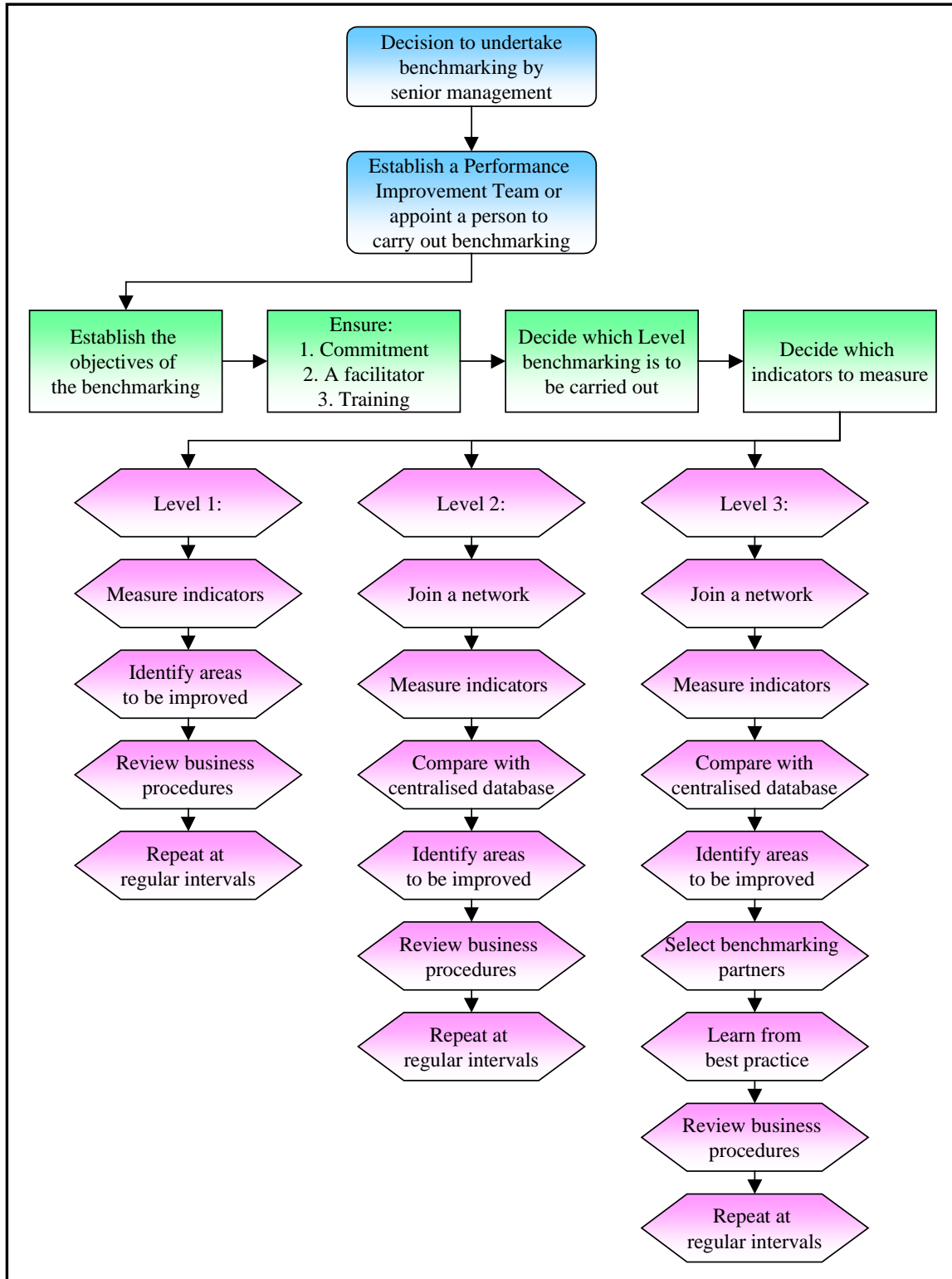


Figure 0.1 The Benchmarking Process



Some companies will set up a PIT to deal with a specific task, whilst others find it more valuable to set up continuing PITs.

The PIT will need continued *high level support* in order to ensure that it can carry out its work. It should be easy to justify this on the basis of its commercial benefit to the company.

It is recommended that the person or persons carrying out the benchmarking are very familiar with the organisational structure of the company.

0.1.24. Performance Improvement Team Resources

A PIT requires the following resources:

- **Commitment:** sufficient time and money resources must be allocated in order to collect data effectively.
- A **facilitator** who will:
 - » arrange and usually run meetings;
 - » ensure that team members are able to carry out agreed actions; and
 - » ensure that progress is monitored and reported.
- Appropriate **training** for members:
 - » team working skills;
 - » how to collect and interpret good quality data; and
 - » some or all members may need to know more about how the company is administered and operated, so they are able to understand how to achieve the implementation of proposed improvements.

Terms and conditions for joining a benchmarking network

The following terms and conditions are appropriate for benchmarking between different companies. In Section 2.1, this is described as Level 3 benchmarking and was not within the scope of the EQUIP project. However, this information is included to give some idea of the likely requirements of moving to full benchmarking.

An operator who wishes to carry out full benchmarking will inform the network database holder of the area(s) in which they wish to improve.

The database holder will seek possible partners among network members with higher values (at least in the upper quartile) of the relevant indicator(s). No data is revealed concerning actual values or ranking of potential partners without a company's express written permission.

All benchmarking is expected to be of two-way benefit and partnerships are established on this basis. For this reason it may be decided that participants only receive data concerning other companies if they have contributed that information as well, which was the case in the EQUIP Network. Companies may be involved with more than one other company in order to donate and receive assistance in several areas.

Benchmarking is built on trust. The database holder makes every effort to avoid conflicts of interest in proposing potential partners and an operator can refuse to benchmark with another without having to give a reason.



Once partnerships are agreed in principle, it is usual to set up a confidentiality agreement. This requires each partner to use the advice, data and information received from the other partner for the sole purpose of improving their own performance and not to disclose it to anyone else.

Benchmarking partners normally visit each other's companies to learn and share best practice. Often, additional measurements will be required to identify more clearly how problems can be tackled and improvements made.

Sometimes partnerships cease when both partners have achieved the required improvement in specified indicators. On other occasions companies develop on-going relationships that progress to work on other areas of the business.



MEASUREMENT METHODOLOGIES

Good quality data is important as it enables companies to derive the greatest benefit from benchmarking.

Good quality data means that it is fit for the purpose for which it is required and it will include the following characteristics:

- (a) The **same measurements** are taken by all companies involved in the benchmarking. The measurements may not be those normally made by the company, and the measurements may not be ideal, but they will be a suitable compromise for all the companies.
- (b) There is **no bias** in the measurements. Whether using a 100% record or a sample, it is very easy for bias to affect results. For example:
 - Although some indicators will not be seasonal, others will be affected by the time period and/or time of year in which the measurement is carried out.
 - In a customer survey, the people who agree to complete the questions may have a very different viewpoint from those who do not. This could lead to bias in the age, ethnic, socio-economic and/or level of mobility profile of the respondents.
 - The time of day, the wording of questions, etc. can create a bias in the responses.
 - Misinterpreting the definition of an indicator may mean that results are not comparable. Sometimes this happens by accident, but at other times it results from a wish to be seen to be doing very well, e.g. the under reporting of minor accidents.
- (c) Measurements should be taken with **sufficient precision**.
 - Minimum sample sizes and sampling periods have been chosen in this Handbook in order to ensure sufficient precision. These do not depend on the size of the operation.
 - The precision with which measurements are quoted should reflect a common sense view of how much an indicator can vary without having any commercial importance, e.g. if the percentage cost of marketing is calculated as 6.73%, it would be rounded up to 7%.
- (d) Having achieved (a) to (c), greater accuracy will only involve greater costs without any accompanying benefits.



sources of data

Types of records

There are 2 methods of data collection:

- **100% records; or**
- **Sampling**

The methods make use of 2 possible routes for collecting data for the benchmarking exercise:

- **Existing records; or**
- **New recording systems**

0.1.25. Existing records

If it is readily available, this is clearly the quickest and cheapest source of providing – usually – 100% records of data.

Even where records already exist, they may not be appropriate for the purpose of benchmarking. It is therefore important that **such records are checked** as part of the benchmarking process. This will involve:

- (i) investigating how the data is collected in order to avoid bias; and
- (ii) ensuring that the definition of the indicator is complied with.

If it is a sample, the sampling system should at least comply with the minimum standards given in Chapters 5 and 7.

0.1.26. New recording systems

New recording systems may take a 100% record or establish a sample. Some factors affecting the collection of data apply to both, whilst others only apply to a sample. New recording systems may well be worth setting up to monitor particular areas of concern highlighted by the initial performance indicator calculation.

Types of survey

This is relevant to all data collection, i.e. existing and new systems that are a 100% record or a sample. **Two categories of survey** can be identified for this Handbook:

- **Technical and performance data**
- **Opinion survey data**



0.1.27. Technical and performance data

This is usually of an objective nature. It is collected from a variety of sources within a company and it will include:

- (i) **Off the road data:**
 - Licensing records.
 - Company accounts.
 - Internal management accounting information.
 - Marketing information.
- (ii) **On the road data:**
 - Surveys of service provision.

0.1.28. Opinion survey data

This data is necessarily subjective, so it will be subject to cultural variation and personal variation. People have different attitudes and tolerance that may or may not be related specifically to the subject matter of the survey: such factors may also affect an individual's response on different occasions. It is suggested that for both passenger and employee surveys, the questions are carefully selected to ensure that false expectations are not generated from the people who respond.

- (i) **Passenger data** is most likely to be collected on the vehicle (as opposed to off the vehicle collection by post, telephone or doorstep):
 - The forms may be completed on the vehicle or taken away and returned later.
 - The forms may be handed out by the driver or a specially appointed person (known as the surveyor).
 - Assistance may or may not be offered when completing the forms.

It is **recommended** that the survey should be carried out as face-to-face interviews on the vehicle, as this method gives the best response rate for questionnaires. Details of this method and suitable alternatives for the EQUIP Handbook are described in further detail in Section 5.

- (ii) **Employee data:**
 - The form is distributed with wage slips and returned to a box (or boxes) located conveniently at the workplace.
 - Face-to-face interviews.



SAMPLING

Section 4.1 identified 2 methods of data collection, a 100% record and a sampling system. Collection using a 100% record is straightforward (provided it is understood what the data actually conveys¹¹ and any possible shortcomings are understood) but sampling requires further consideration. It is important to *check that existing records are appropriate* if they are used for benchmarking. *New recording systems* should also adhere to sampling procedures.

Rationale for sampling

There are two **key objectives** when sampling:

- (i) To take a *representative sample* of the relevant population, and
- (ii) To take measurements or ask questions that give an *unbiased response* (see also Chapter 3).

Every time a population is sampled these measurements form the basis of what is believed to be true for the whole population.

In practice, sampling is difficult to do properly.

How sample data is collected

0.1.29. Technical and performance (off the road) and Opinion survey (employee)

For samples involving employees and vehicles the best samples will give a balanced view of the company using the breakdown of vehicle and employee type used in the Handbook.

Two methods of sampling can be used:

- **Firstly**, a sample is taken in proportion to the size of the employee/vehicle population as follows:
 - (i) The vehicles/employees are ranked by date of entry to the company (for vehicles this is the date of acquisition, whilst for people it is the first date of employment). Alternatively, employees may be ranked in alphabetical order of surname;
 - (ii) Next, every nth vehicle/person is selected according to the sample size that is needed.
- **Or secondly**, vehicles can be sampled by taking the last 100 vehicles monitored by the company, e.g. the last 100 vehicles taken to the workshop for maintenance. This is the simplest approach, but sometimes there may be bias and it is not appropriate for all indicators.

0.1.30. Technical and performance (on the road) and Opinion survey (passenger)

In the case of **passenger surveys** the sample may be affected by numerous time-related factors which can reflect variations in age, sex, ethnic, socio-economic status and level of mobility:

- Time of day: there are peaks and troughs in passenger numbers throughout the day.
- Time of week: variations occur between Monday to Friday, Saturday, Sunday and market days.

¹¹ For example, if using the payroll system, it is important to understand how the calculations are made in order to know the limits of their accuracy.



- Time of year: seasonal and holiday variations are common.

Technical and performance data collected on the road will be affected by passenger numbers and by other traffic conditions (i.e. congestion):

- Time of day: there are peaks and troughs throughout the day.
- Time of week: variations occur between Monday to Friday, Saturday, Sunday and market days.
- Time of year: seasonal and holiday variations are common.

0.1.31. General considerations

For practical reasons it may be impossible to cover the necessary *range of conditions* that apply to the population, e.g. the inclusion of all seasons of the year would delay the benchmarking.

For *ongoing benchmarking*, the database would be built up over a period of time – for example in order to cover seasonal and daily variations – giving a better overall picture of performance.

Examples of data collection by survey

In the following examples the following **factors** are considered:

- The *population*
- Making a *representative and unbiased sample*
- The minimum *sampling period*
- The minimum *sample size*

0.1.32. Technical and performance surveys

The collection of technical data is usually objective and not subject to bias; however, it may be subject to sampling error.

Unless complete records are already kept, some of the technical data will have to be measured for benchmarking in order to measure the performance of the system. Information on how to sample is given alongside each indicator in the EQUIP Handbook. Two illustrative examples are given here:

- (i) Adherence to planned maintenance cycles.
- (ii) Late departures from terminals.

(i) *Off the road*

Adherence to planned maintenance schedule

See **Part II: Indicators, Cluster 8. TECHNICAL PERFORMANCE, indicator 8.4 Level of expected/regular maintenance**

The *population* is all the differences between the planned and actual maintenance cycles measured in terms of kilometres. It is not the vehicles themselves that are being measured, but the operation



of the maintenance system against the maintenance plan. Therefore a vehicle could be – but may not – maintained more than once within a sample.

The maintenance cycle will include both minor and major services, i.e. **all** maintenance that has been planned on a regular basis (as opposed to the result of a breakdown). This will ensure that the sample is *unbiased*.

If there is more than one depot then a full sample will be taken from each one in order to be *representative*. A mean will be taken from these results for the purpose of external benchmarking with other operators. Clearly, the information from each depot is also valuable for internal benchmarking and improvement.

The results will distinguish between vehicle types, since they have different maintenance requirements.

The *minimum size* is the last 100 vehicles maintained **OR** the *minimum sampling period* will be the maintenance record of the last 6 months, whichever is the shorter in time.

(ii) *On the road*

Late departures from terminals

See Part II: Indicators, Cluster **5. RELIABILITY**, indicator **5.1 Starting reliability**.

In this case the *population* consists of all departures at any time of the day throughout the year, from all terminals used by the operator.

For the *sample* to be *representative* the distribution of observations should be approximately proportional to the distributions of the departures throughout each day and at each terminal throughout the year. For example, a service which has twice as many vehicles in the morning peak as opposed to the daytime off-peak should attempt to have twice as many sample observations from the morning peak.

In order to obtain a reasonably *unbiased sample* of the time of day and the variety of terminals, it is important to decide the services and terminals that are sampled prior to going out in the field and to make sure that none of the planned services are missed.

It is quite important that the surveyor [the person collecting the data] does not influence the outcome more than is absolutely necessary. For example, it could be unhelpful if the time and location of the surveyor is known to members of staff whose behaviour could be influenced by this knowledge and therefore affect the outcome, e.g. a driver might make more effort than usual to depart on time.

For indicators like this one, the *minimum sampling period* is 1 week in the first instance. Any resulting data has to be used with caution. However, poor results should not be excluded from the benchmarking process on the grounds of external factors adversely affecting the results, as these values are a true measure of the operator's performance at the time of measurement.



The *minimum size* of the sample should be 400 **OR** a sample size of 100 should be taken and the estimated variability used to decide whether the sample needs to be larger. See Chapter 7 for greater detail concerning sampling size.



0.1.33. Opinion survey (passenger)

See Part II: Indicators, Cluster **10. CUSTOMER SATISFACTION**, indicators 10.4 onwards.

People are the most difficult population to survey because their answers are necessarily subjective and even their inclusion or exclusion from the sample may be of consequence to their opinion. For example, those dissatisfied with a service may more likely to complete a questionnaire voluntarily **OR** they may not be accessed by the survey if they are not using the service.

Opinion surveys are therefore subjective in nature and may be biased. The interpretation of opinion surveys needs to recognise the nature of the sample and the population from which it has been drawn.

For the purpose of this Handbook the *population* is the number of passenger journeys. This means that frequent users will be more highly represented in the population than occasional users – and non-users are not represented at all. This method is used for practical purposes and it is not entirely satisfactory.

To obtain a representative and unbiased sample:

The selection of the routes sampled is at the discretion of the operator. It is preferable to sample several routes reasonably well rather than one route thoroughly, as this gives a broader picture of the operator's performance:

- There should be a good distribution of the different types of route (inner city, urban, regional, rural).
- Sampling should take place throughout the day – even if it is not possible to sample every route throughout the day.
- Sampling should take place on every day of the week – even if it is not possible to sample every route on every day of the week.

The sampling method on the vehicle will depend upon the layout of the vehicle, i.e. whether it has one or more than one entrance.

(1.) *Vehicles with a single entrance*, e.g. standard buses.

- (a) The sample is taken from throughout a route or parts of a route.
- (b) There are three possible sampling methods:
 - (i) A questionnaire is completed by everyone who ***gets on and off*** during the time that the surveyor is on the vehicle. The form is completed by the respondent and it is handed back to the surveyor before leaving the vehicle; *or*
 - (ii) A questionnaire is completed by everyone who ***gets on or is already on*** during the time that the surveyor is on the vehicle. The respondent may or may not leave the vehicle after the surveyor. The form is completed by the respondent and it is handed back to the surveyor or placed in a collection box on the vehicle; *or*
 - (iii) The surveyor selects ***a seated passenger*** and assists with the completion of the forms.

It is more important to be consistent with whichever method is chosen. At Level 3 benchmarking (see Section 2.1) there will be a clear need to standardise collection methods between benchmarking partners. At Levels 1 and 2, consistency of the data collection method is also the most important criteria.



There are always problems with collecting passenger data. The first two methods disadvantage those with poor reading skills, e.g. immigrants; as well as providing an opportunity to make deliberate non-responses to questions. Whilst the last method solves the problems of the first two methods, it leads to the problem of selecting a limited number of respondents if the vehicle is busy, and the selection could be biased by the surveyor.

(2.) Vehicles with multiple entrances, e.g. Metro.

The method will be the same as for (1.) except that the questionnaire is handed to everyone at one entrance, provided there is nothing special about a particular entrance – in which case more than one surveyor is required.

Ideally everyone would be sampled according to the prescribed method, but this is not generally possible. For example, if it is very busy it is not possible to sample everyone, in which case the surveyor must not be selective in deciding who completes the form.

The *minimum sample size* is a total of 400 for the operator. The *minimum sampling period* should be at least one week.

As a result of the various difficulties in sampling it should be recognised that differences in the sampling method may have as big an effect on the results as real differences in the population.



THE CLUSTERS of INDICATORS

The EQUIP project collected over 400 indicators that had been used in the past to measure the performance of public transport operations. This Handbook is special in that it enables self-assessment and the indicators selected for inclusion are regarded as of primary importance in benchmarking local public transport.¹²

In order to simplify the use of Part II of the Handbook, the indicators have been grouped into 11 cluster groups. The rationale for the selection of the groups is given below.

1. COMPANY PROFILE

These indicators describe how a company is organised and the level of penetration within its operating area. These indicators are **not relevant for Level 1 benchmarking** as defined in Section 2.1 as these indicators provide the background for selecting partners with whom to benchmark. Some aspects of the company profile may limit the choice of potential partners, e.g. the size and location of the operating area and the type and number of competitors (if any).

There are five main groups within the company profile:

- » the scale of the operation;
- » operating characteristics;
- » the internal organisation;
- » information systems; and
- » strategic status.

The scale of the operation shows the size of the company within its operating area: this is expressed in terms of the type of area, the number of passenger trips, vehicle distance, market share, and the level of competition for each mode. The operating characteristics are concerned with factors such as the age of vehicles, the collection of fares, the integration of fares between modes and routes, and the operating speed. The internal organisation is concerned with personnel who provide support systems and to monitor environmental issues. Strategic status indicators refer to the knowledge and utilisation of modern planning and business development tools, e.g. the existence of plans for developing the business within the context of environmental, financial, quality, strategic and external factors - these indicators are particularly important for international benchmarking. Information relates to the public interface and the driver-support interface.

2. EXTERNAL INFLUENCES ON OPERATOR

As with the company profile cluster, this is a key set of indicators for determining benchmarking partnerships. These indicators are **not relevant for Level 1 benchmarking** as defined in Section 2.1. The influence of the outside world in which the operator provides its service may be significant for the performance of the operator. This is especially the case if benchmarking is on an international level and the operators come from different market environments with varying degrees of regulation and subsidy. In addition, the legal and operational environment may vary considerably nationally.

At a more local level, the provision of on-road infrastructure can contribute to the performance of an operator, e.g. the supply of park and ride facilities, the presence of traffic signal and lane priority systems and indicators relating to these aspects reside in this cluster.

¹² More detailed indicators are likely to be important when investigating specific aspects of a company in depth. Some suggestions have been made in the Handbook for extension.



3. REVENUE AND FARE STRUCTURE

This cluster collates the indicators that define the fare structure of the operator. These include a general description of the fares over certain distances, together with a look at more detailed indicators such as the relationship between the cost of private and public transport, the ratio between single and monthly tickets, and the non payment of fares.

Clearly, some indicators may be more suited to national than international benchmarking, due to the degree of government intervention in the strategy for determining fares and the level of subsidy available.

4. ASSET/CAPACITY UTILISATION

The utilisation of the vehicles and manpower is the key to the fiscal performance of a public transport operator. The most important indicators are those that consider how full the vehicles are, the time it takes for passengers to board the vehicle, the utilisation of the fleet and the drivers, and the distance travelled by vehicles that does not produce any revenue. These indicators are well suited to international benchmarking as they are comparable and not dependent on monetary units.

5. RELIABILITY

Even if an operator utilises its assets well, its performance may be impeded by poor reliability. For example, services may be delayed or abandoned at the origin or during the journey and the operator may have difficulty in maintaining the planned headway. As with asset/capacity utilisation these indicators are well suited to international benchmarking as they are comparable and not dependent on monetary units.

6. PRODUCTION COSTS

Production cost indicators measure how efficiently the operator is able to provide the service with the available resources. These indicators depend on monetary units. This limits their use as the financial operational framework should be similar between the operators that are benchmarking with each other. However, the production cost indicators are the most relevant indicators from the operators' point of view. These indicators are very important and suitable for a national benchmarking exercise.

Production costs have been split into four components so as to facilitate the identification of weak or strong points. In order to address the weak and strong point of the operator's cost structure it is necessary to split the production cost into four components:

- » salaries;
- » rolling stock;
- » infrastructure; and
- » consumables.

The production cost indicators are determined by calculating the unit salary costs for each employee group, and total costs are related to the number of vehicles, vehicle distance, vehicle hours, number of passenger trips and passenger kilometres. If the operator seems to be failing in any of the cost component indicators, the subsets of the cost component concerned should be investigated in order to find the real reason behind the low figure, e.g. if the salaries bill for operating staff salaries divided by the number of operating staff is high, it could be due to the structure of the operating staff salaries.

For international comparisons within Europe, the Euro is selected as the standard monetary unit and for companies located in countries participating in the Euro, comparisons will be as meaningful as within a single country. Companies in countries *not* participating in the Euro who want to compare across Europe will need to select an appropriate date to use for exchange rate conversion.

7. COMPANY PERFORMANCE

The indicators chosen to measure company performance give a broad overview, such as patronage, the overall operating profit or loss, operating performance, net profit margin and interest cover. Trends over a



period of five years are measured. These indicators tend to be measured in monetary units and the comments made in cluster 6 above apply.

8. TECHNICAL PERFORMANCE

There are two parts to this cluster: firstly, it measures indicators that directly affect on-road performance, e.g. fuel consumption, emissions, reliability and the installation of features that assist passenger mobility. Secondly, it examines the on going maintenance programme.

Most of these indicators are suitable for international benchmarking. For some operators there may be a link between the performance in the reliability cluster and this cluster.

9. EMPLOYEE SATISFACTION

Most of these measures can be evaluated by the operator, using information in the company records. These indicators are suitable for international benchmarking, e.g. staff turnover, time off due to illness, the wage structure and training.

Only one indicator - the sense of personal security - requires a survey amongst the employees. An employee survey could have many more indicators to assess the level of employee satisfaction, but this is not necessary at Levels 1 and 2 in benchmarking and a more detailed survey is at the discretion of the operator.

10. CUSTOMER SATISFACTION

The best and almost the only way to get relevant information about customer satisfaction is to make a survey of the current public transport passengers. Surveys make it possible to examine the importance of indicators to the customer and the level of satisfaction with these indicators. These results can then be compared with the image that the operator has of its performance simply by asking the operator to complete the same questionnaires as the customers.

In addition to customer opinions, hard measure indicators are also relevant for the benchmarking exercise, e.g. the number of complaints and accessibility to vehicles.

Whilst customer satisfaction is generally suitable for international benchmarking, caution must be taken in making comparisons because cultural differences also exist. At Level 3 benchmarking (see Section 2.1), national and international results need to be treated with care, as the base level of passenger conditions will vary substantially between operators.

11. SAFETY AND SECURITY

This cluster covers the actual traffic safety of the operator and the safety of the working environment. It shows the number of incidents on the road, together with the number of injuries sustained by drivers and passengers. These indicators are suitable for international benchmarking.

The passengers' and drivers' sense of security at stops/stations and on vehicles is examined in the customer and employee satisfaction clusters.



Estimation of sample size

An extremely important assumption in the discussion below is that the sample is collected as a simple random sample. This means that the response or characteristic of one member of the sample is not affected by those of the other members. For example, if all 20 people on one bus are asked their opinion of that vehicle's cleanliness, their responses will be much more alike than if 20 people on different buses are asked the same question, so the former would NOT be a random sample. Equally, if vehicles are monitored for late departure from a given terminal on a single day they may all be affected by one common factor (e.g. weather, an accident in the city centre, a flu epidemic) rather than by the range of factors that occur on different days and from different termini.

However, clustering of data collection or opinion surveys is a much more convenient and less expensive method than genuine random sampling of a population. For opinion surveys, one possible way round this problem is to try to ask questions in such a way as to draw from a wider experience than the current journey. For all samples it is also important to cover a wide and representative range of days, times of day, routes, termini, etc., even if the total sample size is then larger than that described below for simple random samples. A full discussion of cluster sampling can be found in many textbooks, including Wonnacott and Wonnacott, *Statistics*.

(a) For indicators with a yes/no answer

The size of sample that is required does not depend on the size of the population unless the sample is quite a large fraction (at least one-quarter) of the population.

For indicators with a yes/no answer (e.g. whether a departure is more than 5 minutes late) it is recommended that

the minimum sample size should be 400.

The purpose of a sample is to estimate/predict the opinions or characteristics of the whole population. Since the estimate is unlikely to be perfect, the sample is used to draw up a range within which the actual truth lies. This is called a **confidence interval**. The deviations from the sample measurement that creates the confidence interval can be thought of as an **error bar** and will depend on the size of sample. The table below records the error bars for sample sizes of 400 (the recommended sample size) and 1000.

Suppose a sample of 400 passengers shows that a proportion – 30% - of passengers say 'Yes' to a question. This table then informs us that we can be 95% confident that the proportion of the **whole population** that would say 'Yes' is between 25.5% and 34.5% (i.e. $30\% \pm 4.5\%$). If the sample size had instead been 1000, then the 95% confidence interval would be $30\% \pm 2.8\%$.

The table also shows that as the **proportion** of 'Yes' responses becomes close to zero, the sample size of 400 is much more accurate. The minimum recommended sample size of 400 will retain sufficient accuracy over all possible outcomes.



Estimated proportion from the sample	95% confidence interval (error bars)	
	Sample size 400	Sample size 1000
50%	± 5%	± 3%
40% or 60%	± 5%	± 3%
30% or 70%	± 4.5%	± 2.8%
20% or 80%	± 4%	± 2.5%
15% or 85%	± 3.6%	± 2.3%
10% or 90%	± 2.9%	± 1.9%
5% or 95%	± 2.1%	± 1.4%
2%	0.9% to 3.9%	± 0.9%
1%	0.3% to 2.6%	0.5% to 1.8%
0%	0% to 0.8%	0% to 0.3%

Interpolation within this table is simple, apart from the last three lines. Error bars for 98%, 99% and 100% can be calculated from these for 2%, 1% and 0%.

(b) For questions or data collection where the answer is coded as a number

Examples of this kind of data would be the number of passengers on a vehicle or the coded responses from an opinion survey. In the most extreme case (e.g. all buses completely full or completely empty, all opinions are at one extreme or the other) this would effectively be the same situation as in (a) above. But, for the intermediate situations that are more usual, the error bars and the appropriate sample sizes would reflect the variability of response and are always smaller. The recommendation is that

- | |
|---|
| <p>(i) the minimum sample size should be 400.</p> <p>OR</p> <p>(ii) a sample size of 100 should be taken and the estimated variability used to decide whether the sample needs to be larger.</p> |
|---|

The first option is by far the simplest. But if sampling is costly the second option may be much better as it could result in only doing a fraction of the work.



Calculation of error bars and minimum sample size:

STEP 1 For the n measurements or coded responses obtained in the sample use a calculator or a computer to work out¹³

the average \bar{x}
the standard deviation s

STEP 2 The error bars are calculated by working out

$$2 \times \text{standard deviation} \div \sqrt{\text{sample size}}$$
$$= \frac{2s}{\sqrt{n}}$$

These are put on either side of the sample average to give a 95% confidence interval of

$$\bar{x} \pm \frac{2s}{\sqrt{n}}$$

Provided the sample has been taken correctly you can be reasonably sure that the average value of the whole population lies within this interval.

STEP 3 To decide what the minimum sample size should be for option (ii) calculate

$$N = 1600 (s/\bar{x})^2$$

A sample of this size or larger will ensure that the error bars are no more than $\pm 5\%$ of the average. Note that a sample of size 100 will be sufficient for this purpose provided s is no larger than $\frac{1}{4}$ of \bar{x} .

¹³ The average is also called the mean, and the standard deviation can be denoted SD, sigma, σ_n , σ_{n-1} . Minor differences in the method of calculation are of no practical significance here. However the standard error or se is equal to s/\sqrt{n} and must NOT be used in place of s . As a rough check to ensure that the standard deviation is being used, you should find that nearly all the individual measurements in the sample should lie within 2 standard deviations from the mean, i.e. in the interval $\bar{x} \pm 2s$. If this is not the case, then the standard deviation calculation should be checked.



European Commission DG TREN
EQUIP Extending the Quality of Public Transport
Version Number 21
Dissemination Level Public
Date Prepared 26 June 2001

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The EQUIP Handbook for the self-assessment of the performance of local public transport services



Part II: The Indicators Guide to Completion of the Handbook



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INTRODUCTION

Contents of the Handbook of Indicators

Part II of the EQUIP Handbook is available in two formats (paper and Excel spreadsheet) that are ready for self-completion. Users of the electronic copy should download the Readme.txt file for the latest information concerning data entry and the use of the Excel spreadsheets. The Handbook is composed of the following sections.

Contents


This describes the layout of the Handbook.

Indicator List

This lists the 11 clusters, their constituent indicators and gives references according to their page number.



System Definitions

This is a reference sheet of definitions for important terms used in the Handbook.

-  In the electronic copy of the Handbook notes are used at the indicators to inform users of these definitions.

Common Elements


This tabulates the elements of indicators that occur more than once in the Handbook. Completion of these tables will save time in the calculation of indicators.

-  In the paper copy, the Common Elements sheet is mounted separately for quick reference and is also bound in the Handbook, in case the separate sheet is mislaid.
-  In the electronic copy, data entered in the Common Elements sheet is automatically copied to the relevant indicators.

Indicators – 11 sections

These sections contain all the clusters and their constituent indicators. **The indicators are specially defined for the purpose of this Handbook: it is important to use these definitions in order to ensure comparability of results between operators.**

There are two main types of **data characteristics** for the indicators:

- (i) Those requiring qualitative data; and
- (ii) Those requiring quantitative data.
 -  In the electronic copy, the final values are automatically calculated from the data entered into the component cells.

There are 5 versions of the Handbook, according to **type of mode** (bus, trolley bus, tram/light rail, Metro and local heavy rail). The same indicators are used for each mode (with occasional variations in application) enabling benchmarking between modes.




Many indicators require the **sub-division of information**. This will be according to:

- (i) **Types within each mode**, as they have different characteristics. Depending upon the nature of the indicator it may require a full mode list which distinguishes all types within a mode.
- (ii) **Type of service area** covered by the operator (urban access, connecting rural and urban areas, and rural access).
- (iii) **Other sub-division** facilitates the interpretation of the indicator, e.g. salary groups to find cost per employee; peak and off-peak services to find planned operating speed.

Opinion Survey Data and Weighted Average Forms

Two clusters require the collection of opinion survey data from employees and passengers. These spreadsheets prescribe the weighted averages of the data for EQUIP.

-  In the electronic copy, the final values of the weighted averages are automatically calculated from the raw data. These values are also copied automatically to the indicators in the relevant clusters.

In order to simplify the Handbook there is no sub division according to the size of the operator or the level of competition. However, indicators in the Company Profile and External Influences on the Operator clusters establish these factors and will need to be taken into consideration when benchmarking with other operators.

Selection of Samples

Further details about sources of data and the selection of samples are found in Part I: Method, Chapters 4 and 5. Before sampling, it is important to read these two chapters. There are two types of *sample measurement recording systems*:

(A) TECHNICAL AND PERFORMANCE (OFF THE ROAD) AND OPINION SURVEY (EMPLOYEE)

For samples involving vehicles and employees the best samples will give a balanced view of the company using the breakdown of vehicle and employee type used in the Handbook.

Two methods of sampling can be used:

- **Firstly**, the sample takes the last 100 vehicles monitored by the company, e.g. the last 100 vehicles taken to the workshop for maintenance. This is the simplest approach, but sometimes there may be bias and it is not appropriated for all indicators. The definition of the indicators in the Handbook shows where the simple approach is appropriate.
- **Or secondly**, a sample is taken in proportion to the size of the employee/vehicle population as follows:
 - (i) The vehicles/employees are ranked by date of entry to the company (for vehicles this is the date of acquisition, whilst for people it is the first date of employment). Alternatively, employees may be ranked in alphabetical order of surname;
 - (ii) Next, every nth vehicle/person is selected according to the sample size that is needed.



The *employee opinion survey* may be circulated to all relevant employees with their payslips in one period. A box (or boxes) should be placed at convenient places for the completed questionnaires. A reproducible example of an employee opinion survey is given in Section 5.



(B) TEC
TECHNICAL AND PERFORMANCE (ON THE ROAD) AND OPINION
SURVEY (PASSENGER)

Technical and performance data collected on the road will be affected by passenger numbers and by other traffic conditions (i.e. congestion). The sample should take account of following factors:

- Time of day: there are peaks and troughs throughout the day.
- Time of week: variations occur between Monday to Friday, Saturday, Sunday and market days.
- Time of year: seasonal and holiday variations are common.

In the case of **passenger surveys** the sample may be affected by numerous time-related factors which can reflect variations in age, sex, ethnic, socio-economic status and level of mobility. The sample should take account the same factors as the on-road technical and performance surveys.

The questionnaires will be handed out by a surveyor to all passengers as they enter the vehicle. The passenger completes the forms and these will be placed in a box or boxes on the vehicle. The passenger can make additional comments in the space provided on the form. The surveyor should be available to assist with queries concerning the completion of the form. The surveyor should also complete a table describing the route, vehicle location, etc. for each vehicle sampled. A reproducible example of a passenger opinion survey is given in Section 5.

Sample Size

It is recommended that where a *sample measurement recording system of technical and performance data (on and off the road)* is carried out, the sample size is a **minimum of 400**.

If this is not possible, an **initial sample of 100** should be used and this should be **checked** to determine whether 100 is large enough. Use a calculator or a computer to work out¹⁴ the average, \bar{x} and the standard deviation, s ¹⁵. Then, if more than 80% of the observations are within average ± 2 standard deviations, the sample size is large enough. If less than 80% fall into this category then a larger sample should be sought.

The minimum size of a *passenger opinion survey* is **400 per mode**.

The *employee opinion survey* should collect data from **all employees** in the relevant categories [drivers/conductors, station staff, maintenance/ancillary], unless there are more than 400; in this case a sample of **400** should be taken, in accordance with Section 1.2 (a) above.

¹⁴ The average is also called the mean, and the standard deviation can be denoted SD, sigma, σ_n , σ_{n-1} . Minor differences in the method of calculation are of no practical significance here. However, the standard error or *se* is equal to s/\sqrt{n} and must NOT be used in place of *s*.

¹⁵ Care must be taken to ensure that the calculation of the standard deviation is correct (and is not confused with the standard error, see footnote 1).



Frequently asked Questions

What if

..... Data cannot be split up?

- For example costs for buses and trolley buses. A Handbook for each mode should be completed. For indicators where it is not possible to disaggregate data, complete both Handbooks with aggregated data and make a note of this action in the blank cell beneath the title of the indicator.

..... Some on-road services are subcontracted?

- A separate Handbook should be completed for each subcontractor.

..... Some or all of the off-road services are subcontracted?

- Include the costs for these services.
- If this data is not available, make a note of it in the Handbook.

..... Not all the indicators are completed?

- This may result from the inability to access relevant data, e.g. passenger surveys and employee surveys require a considerable use of resources **or** data may be unavailable temporarily **or** the operator does not wish to disclose the data.
- Ideally, all indicators are completed in order to maximise access to information and the usefulness of the benchmarking process.
- However, even if only some indicators are completed, the operator should gain some benefit from the process. See also the next question.

..... Resources are very limited?

- It is recognised that some companies do not have the resources to devote to detailed benchmarking. For this reason, a number of base indicators have been identified from the full Handbook. They also appear together on a separate spreadsheet: all participating companies should aim to complete all of these indicators.
- In addition, a number of indicators only require approximate data because:
 - » it is easier to obtain;
 - » it provides sufficient information as it places the operator clearly somewhere on a scale, e.g. poor, adequate, good or excellent; small medium, large or very large; and
 - » having been placed on a scale, more detailed measurements can be taken in order to be more precise when proceeding towards full benchmarking.

.....The recommended units of measurement cannot be used easily?

- For Level 1 benchmarking (internal assessment) it does not matter whether Euro or the local currency are used, similarly miles can be used instead of kilometres.
- For Level 2 benchmarking (comparison with a reference database) it is essential that data is converted to the recommended units, in order to make rapid comparisons between companies.



METHOD OF COMPLETING THE HANDBOOK

Layout of the Handbook

This page may be kept open in order to help you fill in the data.

The Handbook of the indicators has been prepared as a spreadsheet. Many boxes are colour coded in order to assist with the completion of the Handbook.										
1.	The indicators are presented in 11 clusters. The order of the indicator clusters has been arranged in order to assist with the interpretation of the results. See the Indicator List sheet in Part II: The Indicators for a list of the clusters.	Cluster no. and name								
2.	Each indicator is given a short name and a longer definition. Where necessary, comments are made about the measurement of the indicator. See the Indicator List sheet in Part II: The Indicators for a list of the indicators and their page numbers in the Indicators spreadsheets.	Indicator no., name, definition								
3.	An instruction may be given in order to facilitate the correct completion of the indicator.	Instruction								
4.	The recommended measurement period and method of data collection is given for each indicator. The <i>bold italicised text</i> is used in the Handbook. See Table below.	Period Method								
<table border="1" style="width: 100%; background-color: #e0ffe0;"> <tr> <td colspan="2">Measurement Period: <i>Annual.</i> <i>Minimum</i> measurement period of <i>1 week</i>.* The data used is the <i>most up to date information available.</i></td> </tr> <tr> <td colspan="2">Data Collection Method: Data from <i>existing records</i>. Data from <i>operator's personal knowledge</i> of the environment. A <i>full measurement recording system</i> is required. A <i>sample measurement recording system</i> is required.* <i>Sample opinion survey.</i></td> </tr> <tr> <td colspan="2">*The Guide to Completion of the EQUIP Handbook gives simple rules to follow in the selection and size of samples. The methodology is described in Part I.</td> </tr> <tr> <td colspan="2">In some indicators more than one Measurement Period and/or Data Collection Method can be used.</td> </tr> </table>			Measurement Period: <i>Annual.</i> <i>Minimum</i> measurement period of <i>1 week</i> .* The data used is the <i>most up to date information available.</i>		Data Collection Method: Data from <i>existing records</i> . Data from <i>operator's personal knowledge</i> of the environment. A <i>full measurement recording system</i> is required. A <i>sample measurement recording system</i> is required.* <i>Sample opinion survey.</i>		*The Guide to Completion of the EQUIP Handbook gives simple rules to follow in the selection and size of samples. The methodology is described in Part I.		In some indicators more than one Measurement Period and/or Data Collection Method can be used.	
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In some indicators more than one Measurement Period and/or Data Collection Method can be used.										
5.	One or more components may be used to determine the final value of the indicator. Some of these components will be used more than once in the Handbook and these will be clearly indicated in order to save time.	Component Final value								
6.	Many indicators will be composed of several subsets, some of which will not be relevant to all operators.									
7.	Nearly all indicators will have some commentary concerning one or more of the following: (i) Its value in benchmarking; (ii) Other indicators that it has an impact upon or have an impact upon it; (iii) How the indicator can be examined in further detail.	Commentary								



Completing the Handbook

Worked examples for completing indicators are given in Section 2.4 of this Guide. Figure 2.1 is a check list for the completion of the Handbook in the form of a flow diagram.

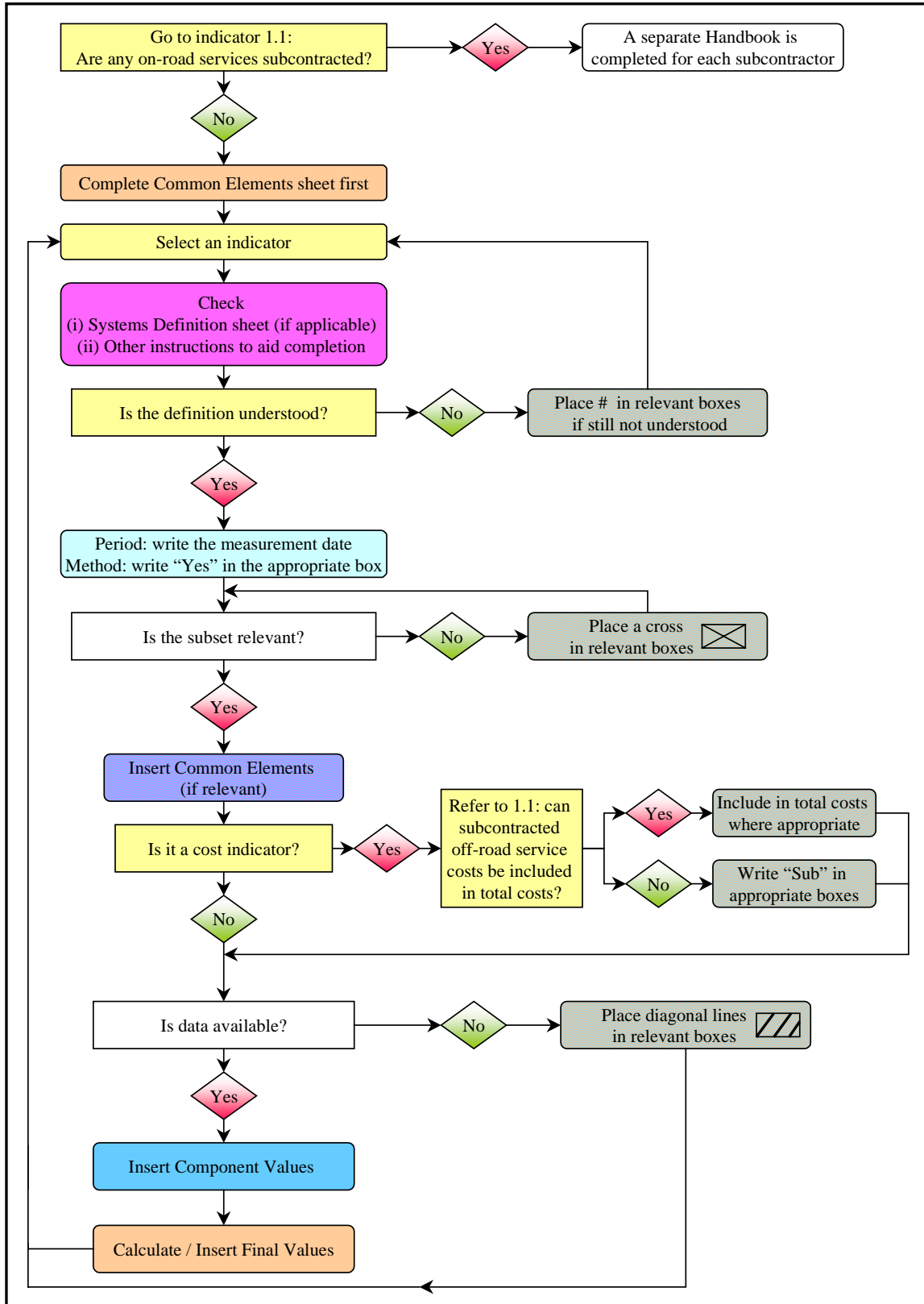


Figure 0.1 Checklist for completing the EQUIP Handbook





1.	Download the Readme.txt file if using the electronic copy.									
2.	If on-road service(s) are subcontracted to another operator, exclude all data concerning those services from all answers in the Handbook. If such services form an important part of your operation, a separate Handbook should be completed for each subcontractor.									
3.	Some indicators and/or their constituent elements are used in more than one indicator . The Common Elements sheet shows the clusters and indicators in which these repetitions occur. Complete the Common Elements before the rest of the Handbook. With the paper copy this will save time when calculating the indicators. For ease of use, this sheet is enclosed as a separate item. The values are automatically transferred to the relevant indicators in the paper copy.	Common Element value								
4.	Select the indicators that will be completed in the Handbook. There is no obligation to complete all the indicators. However, most benefit will be derived from the process if as many indicators as possible are determined. In addition, operators who intend to compare results with a database will only be able to receive data concerning the indicators for which they have collected data. Use the definitions given in the EQUIP Handbook in order to maximise the comparability of sites. Please do not assume that any definition you might normally use is the one required by EQUIP.	Indicator number, name and definition								
5.	For each indicator check that the definition is understood . The list of System Definitions before the indicators is an aid to this process. The electronic copy will provide relevant definitions as a note.	System Definition								
6.	Check any other special instructions concerning the indicator	Instructions								
7.	If the information required is not understood , place a hash mark "#" in the relevant box(es).	#								
8.	There may be more than one recommended measurement period the and/or method of data collection. For all indicators , give the date of appropriate data collection period and place "Yes" in the appropriate method box.	<table border="1"> <tr> <td>Period 1</td> <td>Date</td> </tr> <tr> <td>Period 2</td> <td></td> </tr> <tr> <td>Method 1</td> <td></td> </tr> <tr> <td>Method 2</td> <td>Yes</td> </tr> </table>	Period 1	Date	Period 2		Method 1		Method 2	Yes
Period 1	Date									
Period 2										
Method 1										
Method 2	Yes									
9.	Some members of the subset(s) may not be relevant to an operator. They should be indicated by placing a cross in each relevant box on the spreadsheet.	X								
10.	If there are subcontracted off-road service(s) in any of the following off-road cost categories [operating staff, maintenance staff (rolling stock), maintenance staff (infrastructure), marketing and promotion staff, management, administration and other staff], the Handbook should include these costs in total costs. If it is not possible to include this information for some indicators, write "Sub" in the appropriate boxes in the Handbook.	Sub								
11.	If it is not possible to disaggregate information according to mode type, use aggregated data and clearly state which modes are being aggregated in the box below the name of the indicator.	Mode A and Mode B aggregated								
12.	In some cases the data will not be available or the value is not known: this should be shown by diagonal stripes in each relevant box on the spreadsheet.									
13.	Insert the values for each element and each subset into the relevant boxes on the spreadsheet. <i>Care must be taken if different samples are used for different indicators, i.e. the data source must be compatible for all the elements used to calculate an indicator.</i>	Component value								
14.	The elements are used to calculate the final value(s) of the indicator. Quantitative values are automatically calculated in the electronic copy.	Final value								
15.	Enter Opinion survey data (employees and passengers) in the separate spreadsheets. Calculate the weighted averages and copy to the relevant indicators in Clusters 10 and 11. The weighted averages are automatically calculated and copied to the indicators in the electronic copy.	Data								
		Final Values								



After completion of the Handbook

Having completed the Handbook there are three options:

1. The Handbook is used solely for the purpose of self-assessment, Level 1 benchmarking, and the company decides which areas of performance require improvement. Internal benchmarking is achieved by taking repeat measurements regularly over a period of time in order to monitor performance.
2. The data in the Handbook is used to compare the company with the centralised EQUIP database. There is no direct contact with other companies, the data is anonymous, and the company only receives data concerning indicators for which it has supplied data.
3. The company decides to move to Level 3 or full benchmarking and seeks appropriate partners.

Worked Examples

Three worked examples from the Handbook are given in this section. Each indicator is completed in the three stages:

1. The *general* format of the indicator
2. The *first* stages in completing the indicator.
3. The *completed* indicator.

0.1.34. Company Profile: 1.13 Type of Service

Stage 1

This type of indicator is asking for a “Yes” response based upon several options. The indicator is subdivided into subsets (1 to 8).

No. CLUSTER TITLE

No.	Short name of indicator	Definition of the indicator		
		Comments about the measurement of the indicator.		
		Special instructions for calculating the indicator.		
		Period: One or more of 3 options recommended		
		Method: One or more of 5 options recommended		
		Name of indicator		
		Final value for subset A	Final value for subset B	Final value for subset C
	Subset member 1			
	Subset member 2			
	Subset member 3			
	Subset member 4			
	Subset member 5			
	Subset member 6			
	Subset member 7			
	Subset member 8			
Commentary				

Figure 0.2 Worked Example: Indicator 1.13 Type of Service



Stage 2

Check that the *definition of the indicator is understood*. The list of system definitions is an aid to this process. Use the *definition given in the EQUIP Handbook* in order to maximise comparability between sites.

Only *approximate data* is needed for this indicator.

This indicator is completed by writing “Yes” in appropriate boxes.

As more than one data collection method is suitable, the operator needs to *write “Yes” in the appropriate box*.

The *commentary* describes how a number of indicators that may impact upon this indicator.

1. COMPANY PROFILE

1.13 Type of service	Percentage of vehicle kilometres for different types of service run by the operator.		
	See System Definitions sheet for definition of service areas (urban access, etc.), demand responsive transport, night services, special transport services and premium services.		
	Use approximate data.		
	Period: Most up to date information available		
	Method: Operator's personal knowledge		
	Approximate percentage of vehicle kilometres		
	Urban access	Connecting	Rural access
Fixed			
Flexible/Demand Responsive Transport services			
Night services			
Special transport services: disabled and elderly			
Special transport services: school children			
Special transport services: work contracts			
Express/limited stop services			
Premium services			
<p>The proportion of each type of service will affect a number of indicators, e.g.</p> <p>(i) Special transport services often attract subsidies (external contributions to variable costs [2.9]), thereby affecting Production Costs [Cluster 6] and fare levels [3.2].</p> <p>(ii) Flexible/demand responsive services may have higher infrastructure costs [Cluster 7], but attract savings elsewhere (e.g. lower costs for providers of special transport services) and an improved load factor [4.1] when compared with similar fixed route services. Route and network length [1.2] are variable.</p> <p>(iii) A high percentage of night services may be linked with low timing point reliability [5.2].</p>			

Figure 2.2 (continued) Worked Example: Indicator 1.13 Type of Service

Stage 3

Since the following types of service are *not operated*, a *cross* has been written in the subsets for all rural access services, four types of connecting service and three types of rural access service.

The operator has used the *method* of personal knowledge to complete this indicator, so “Yes” has been written here.

The most up to date information *period* for this indicator was *10/05/00*.

The approximate percentage of vehicle kilometres shows that the greatest total distance is covered by fixed urban access services (68%), followed by fixed connecting services (30%) and demand



responsive urban access services (2%). The remaining types of service are members of those three service types: in urban areas there are special transport services for the disabled and elderly (2%) and schoolchildren (5%), some of which may be demand responsive. There are more night urban access services (4%) than connecting ones (less than 1%). A substantial proportion of connecting services are express (8%) and limited stop (2%).

1. COMPANY PROFILE

1.13 Type of service	Percentage of vehicle kilometres for different types of service run by the operator.		
	See system Definitions sheet for definition of service areas (urban access, etc.), demand responsive transport, night services, special transport services and premium services.		
	Use approximate data.		
	Period: Most up to date information available	10/05/00	
	Method: Operator's personal knowledge	Yes	
	Approximate percentage of vehicle kilometres		
	Urban access	Connecting	Rural access
Fixed	68	30	
Flexible/Demand Responsive Transport services	2		
Night services	4	<1	
Special transport services: disabled and elderly	2		
Special transport services: school children	5		
Special transport services: work contracts			
Express/limited stop services		8	
Premium services		2	
<p>The proportion of each type of service will affect a number of indicators, e.g.</p> <p>(i) Special transport services often attract subsidies (external contributions to variable costs [2.9]), thereby affecting Production Costs [Cluster 6] and fare levels [3.2].</p> <p>(ii) Flexible/demand responsive services may have higher infrastructure costs [Cluster 7], but attract savings elsewhere (e.g. lower costs for providers of special transport services) and an improved load factor [4.1] when compared with similar fixed route services. Route and network length [1.2] are variable.</p> <p>(iii) A high percentage of night services may be linked with low timing point reliability [5.2].</p>			

Figure 2.2 (continued) Worked Example: Indicator 1.13 Type of Service

0.1.35. Asset Capacity/Utilisation: 4.7 Boarding time

Stage 1

Firstly, this type of indicator requires a “Yes/No” response for three queries concerning the indicator. It then asks for a “Yes” response for four subsets.

Stage 2

Check that the *definition of the indicator is understood*. The list of system definitions is an aid to this process.

Use the *definition given in the EQUIP Handbook* in order to maximise comparability between sites.

This indicator is completed by responding to a *series of questions* which relate to boarding time. The instructions to aid completion of the indicator describe the qualitative and quantitative data that are needed.

As more than one data collection method is suitable, the operator needs to *write “Yes” in the appropriate box*.



No. CLUSTER TITLE

No. Short name of indicator	Definition of the indicator.			
	Comments about the measurement of the indicator.			
	Special instructions for calculating the indicator.			
	Period: One or more of 3 options recommended			
	Method: One or more of 5 options recommended			
Indicator query 1				
Indicator query 2				
Indicator query 3				
	1st possible "Yes" option	2nd possible "Yes" option	3rd possible "Yes" option	4th possible "Yes" option
Subset member 1				
Subset member 2				
Subset member 3				
Subset member 4				
Commentary				

Figure 0.3 Worked Example: Indicator 4.7 Boarding Time

The *commentary* discusses the difficulty of measuring average boarding time and justifies the use of surrogate measures for it. It also identifies another indicator that has a major impact upon average boarding time.

4. ASSET CAPACITY/UTILISATION

4.7 Boarding time	The time taken for one extra passenger to board the vehicle (marginal boarding time) and other factors affecting boarding time.			
	Place "Yes" or "No" in the box for the first question.			
	Give the time in minutes for the second question.			
	Give approximate data for the third question.			
	Place "Yes" in appropriate boxes for the last four questions.			
	Period: Minimum 1 week			
	Method: Existing records Sample measurement recording system			
Do you measure marginal boarding time?				
If yes, what is the marginal boarding time?				
What percentage of passengers purchase tickets on the vehicle?				
	No	Sometimes	Mostly	Always
Does board/alighting occur simultaneously?				
Do you use conductors?				
Are tickets validated at the time of boarding?				
Is change given?				
Instead of using average boarding time, which is not easy to measure and requires a lot of resources, marginal boarding time can be used: the time taken for one extra passenger to board the vehicle removes the effect of the bus stopping, doors opening and passengers reacting. Vehicle accessibility [10.3] also has an impact on boarding time.				

Figure 2.3 (continued) Worked Example: Indicator 4.7 Boarding Time

Stage 3

The operator has used the *method* of existing records to complete this indicator, so "Yes" is written in the adjoining box. The measurement *period* was the month of *November 1999*.

Although marginal boarding time is measured ("Yes" to the first question), the value is not known, so *diagonal lines* have been written in the second box. This situation may have arisen because the data has not yet been analysed. The last information in this group of three questions is the approximate percentage of passengers who purchase tickets on the vehicle.



The last four responses show that boarding/alighting usually occurs simultaneously, conductors are never used, most tickets are validated at the time of boarding and change is always given.

4. ASSET CAPACITY/UTILISATION

4.7 Boarding time	The time taken for one extra passenger to board the vehicle (marginal boarding time) and other factors affecting boarding time.			
	Place "Yes" or "No" in the box for the first question.			
	Give the time in minutes for the second question.			
	Give approximate data for the third question.			
	Place "Yes" in appropriate boxes for the last four questions.			
	Period: Minimum 1 week	1-11-99 to 30-11-99		
	Method: Existing records	Yes		
	Sample measurement recording system			
	Do you measure marginal boarding time?	Yes		
	If yes, what is the marginal boarding time?			
	What percentage of passengers purchase tickets on the vehicle?	80		
		No	Sometimes	Mostly
	Does board/alighting occur simultaneously?	Yes		
	Do you use conductors?	Yes		
	Are tickets validated at the time of boarding?	Yes		
	Is change given?	Yes		
Instead of using average boarding time, which is not easy to measure and requires a lot of resources, marginal boarding time can be used: the time taken for one extra passenger to board the vehicle removes the effect of the bus stopping, doors opening and passengers reacting. Vehicle accessibility [10.3] also has an impact on boarding time.				

Figure 2.3 (continued) Worked Example: Indicator 4.7 Boarding Time

0.1.36. Technical Performance: 8.1 Fuel Consumption

No. CLUSTER TITLE

No.	Short name of indicator	Definition of the indicator.		
		Comments about the measurement of the indicator.		
		Equation for calculation of the indicator.		
		Special instructions for calculating the indicator.		
		Period: One or more of 3 options recommended		
		Method: One or more of 5 options recommended		
		1st element of indicator	2nd element of indicator	Final value of indicator
	Total			
	Subset member 1			
	Subset member 2			
	Subset member 3			
	Subset member 4			
	Subset member 5			
	Subset member 6			
Commentary				

Figure 0.4 Worked Example: Indicator 8.1 Fuel Consumption



Stage 1

This type of indicator requires the calculation of an indicator that is composed of two elements. The indicator is subdivided into subsets (1 to 6).

Stage 2

Check that the *definition of the indicator is understood*. The list of system definitions is an aid to this process.

Use the *definition given in the EQUIP Handbook* in order to maximise comparability between sites.

This indicator includes an *equation* to assist with the calculation of the indicator.

The indicator is completed by writing the *total fuel used* and the *number of vehicle kilometres* for each type of bus (except trolley bus) operated. and then *calculating the average fuel used per 100 km for each mode*.

As the number of vehicle kilometres is used at least once in the Handbook, it has already been completed on the *Common Elements* sheet, which is available as a separate sheet for use in completing the Handbook. In the electronic copy of the Handbook, this data will automatically appear in the indicator.

As more than one measurement period is suitable, the operator needs to *write the period used in the appropriate box*.

The *commentary* suggests other indicators that will impact upon the fuel consumption.

8. TECHNICAL PERFORMANCE

8.1 Fuel consumption	Average quantity of fuel required per 100 kilometres travelled. Diesel is measured in litres and electricity in kilowatt hours.		
	Each carriage on a service is one vehicle, e.g. a 4 carriage metro train is regarded as 4 vehicles.		
	Average fuel used per 100 km = $\left \frac{\text{Total fuel used}}{\text{No. of vehicle km}} \right 100$		
	Number of vehicle kilometres: see Common Elements sheet.		
	Period: Annual		
	Minimum 1 week		
	Method: Existing records		
	Total fuel used	Number of vehicle kilometres	Average fuel used (fuel/100km)
Bus: total	0	0	0
Small			
Midi			
Standard			
Double deck			
Articulated single deck			
Articulated double deck			
Fuel consumption is expected to be greatest in urban access services, followed by rural access and then connecting services. Benchmarking should initially compare operators with similar types of services. The age of vehicles (fleet composition [1.6]) should also be considered.			

Figure 2.4 (continued) Worked Example: Indicator 8.1 Fuel Consumption



Stage 3

In this worked example, the “Buses except trolley buses” mode version is being completed by the operator. A **cross** has been written in the subsets for double deck buses and both types of articulated buses as they are **not operated**.

The operator has used an annual **period** ending **31/03/00** to complete this indicator.

There is no choice in the **method** used, but “Yes” is written as a check that the method to be used has been noted.

The total fuel used and number of vehicle kilometres **elements** have been inserted and used to **calculate** the average fuel used per 100 km for small buses, midi buses and standard buses. The small bus data is based upon a fleet of 32 vehicles each covering an average of 41,220 vehicle kilometres per year, giving a fleet total of 1,319,040 vehicle kilometres; they have consumed a total of 290,188 litres of fuel, giving an average fuel consumption of 21.9 litres/100 kilometres. Each vehicle in the midi bus fleet of 140 covers an average of 39,340 vehicle kilometres per year giving a total of 5,507,600 vehicle kilometres and using a total of 1,431,976 fuel. This gives an average fuel consumption of 26 litres fuel/100 kilometres. The standard bus data is based on a fleet of 325 vehicles each covering an average of 36,250 vehicle kilometres per year, giving an average fuel consumption of 28 litres/100 kilometres. Finally, the average fuel consumption for all buses is given (33.3 litres/100 km). In the electronic version of the Handbook, these calculations are automated.

8. TECHNICAL PERFORMANCE

8.1 Fuel consumption	Average quantity of fuel required per 100 kilometres travelled. Diesel is measured in litres and electricity in kilowatt hours.		
	Each carriage on a service is one vehicle, e.g. a 4 carriage metro train is regarded as 4 vehicles.		
	Average fuel used per 100 km = $\left(\frac{\text{Total fuel used}}{\text{No. of vehicle km}} \right) 100$		
	Number of vehicle kilometres: see Common Elements sheet.		
	Period: Annual	01/04/99 - 31/03/00	
	Minimum 1 week		
	Method: Existing records	Yes	
	Total fuel used	Number of vehicle kilometres	Average fuel used (fuel/100km)
Bus: total	6199039	18607890	33.31403507
Small	290188	1319040	21.99993935
Midi	1431976	5507600	26
Standard	4476875	11781250	38
Double deck	X	X	X
Articulated single deck	X	X	X
Articulated double deck	X	X	X
Fuel consumption is expected to be greatest in urban access services, followed by rural access and then connecting services. Benchmarking should initially compare operators with similar types of services. The age of vehicles (fleet composition [1.6]) should also be considered.			



Figure 2.4 (continued) Worked Example: Indicator 8.1 Fuel Consumption

0



questionnaire design for opinion surveys

1. Passenger surveys

In order to assist with the benchmarking process the following **information should be recorded** by the person carrying out the survey:

- The date.
- The route.
- The location on the route (if part of the route is sampled).
- The number of passengers sampled.
- The type of vehicle.

Passenger surveys should be carried out by the surveyor handing out the form as passengers board the vehicle for **completion by the passengers**; the completed form should be returned to the surveyor or placed in a labelled box before the passenger leaves the vehicle; the surveyor should be available to assist passengers with queries concerning the completion of the questionnaire.

The questionnaire should make it clear that the respondent is being asked their overall opinion of all **journeys with the operator during the last 2 weeks**, i.e. the questionnaire is not particularly about to-day's journey.

The passenger's response to each indicator has 2 parts:

- Firstly, it is necessary to find out the **importance** of the indicator for the passenger. The response will be on a scale of 1 to 4, i.e. from no importance to very important.
- Secondly, the passenger will be asked their **opinion** of the indicator. The response will be on a scale of 1 to 4, i.e. where 1 is poor and 4 is excellent.

It will therefore be possible to weight the responses according to the importance and the opinion of the indicator. In this way the results will take into account the personal needs of a passenger, e.g. a person in a wheelchair will have a strong interest in access and may be more critical of the facilities than an able bodied person. A full description of the weighting procedure is given in Section 4.

If the operator is aware of the substantial use of **more than one language**, it is advisable to produce leaflets for these populations.

The suggested **layout design** for the questionnaire is given in Section 5. It is recommended that the questionnaire is printed on paper of higher stiffness than normal paper, in order to make it easier for the passenger to complete. It should also be pre-folded both ways, in order to promote easy handling of the paper.

1. Employee surveys

Employee surveys should not be carried out as face-to-face interviews, in order to promote the confidentiality of the responses. Instead, the forms should be **placed in the payslips**; completed forms are placed in box(es) placed at convenient locations in the workplace.

The employee's response has two parts. Firstly, it asks about the **importance** of the indicator for the employee. Secondly, it asks their **opinion** of the indicator.



Responses are coded and the weighting procedure, together with the guidelines for the production of the questionnaire, are the *same as for the passenger survey*. These are given in Section 4.

The suggested **layout design** for the questionnaire is given in Section 5.

Operators may wish to ask different questions of their staff than are identified on the questionnaire given in Section 5. At Level 1 benchmarking, where results are not compared outside the company, this will not be a problem. To make meaningful comparisons at Level 2 or Level 3 benchmarking, questions need to be standardised.



calculation of the AVERAGE wEIGHTed SCORE from the passenger and employee opinion surveys

The principle of calculating the average weighted score

Perceptions of quality by passengers or employees are necessarily subjective. In addition, some characteristics of public transport are of more importance to some passengers/employees than others. The sample opinion survey is designed to combine these aspects: therefore respondents are first asked how important each characteristic is to them, before asking the respondent to give their opinion rating of each characteristic.

Responses cannot simply be added together, since this would give the same weight to Passenger X who said the characteristic had little or no importance to them but rated it highly and Passenger Y who found the characteristic to be very important but rated it poorly. As a first step, the data from the sample opinion surveys will be used to produce two weighted averages: one to describe the weighted average importance to the respondent and the other to describe the weighted average opinion of the characteristic. Later, the data can be used for further investigation, if required.

It is suggested that the data should be entered in a tabular form (as identified in the employee and passenger data entry sheets in the Indicators Excel spreadsheet). This will allow the calculation of the weighted averages to be automatic. Perhaps more importantly, the suggested weighted averages will remove the link between how important a characteristic is to an individual and that same individual's opinion of it: data entry as suggested will allow more detailed analysis to be conducted without any further data entry.

The method of calculating the average weighted score

This section describes, step by step, the calculation of the average weighted score and illustrates this with a simple example.

Stage 1

Each question on the sample opinion survey questionnaire has two parts [the importance (I) to the respondent and their opinion (O)], each with four possible responses: this gives a total of 16 different combinations of responses.

The first step is to count the number of responses for each combination and enter these in a table.

For example: A passenger sample opinion survey has 400 responses on Question 1: State of repair and cleanliness

In this example survey 75 respondents found this characteristic to be of no importance to them (row I = 1). 5 of these had a poor opinion (O = 1), 20 had an opinion rating of O = 2, 35 had an opinion rating of O = 3, and 15 gave an excellent opinion rating (O = 4). These figures are entered in the first row of the table. The second to fourth rows of the table (I = 2 to 4) are completed in the same way.



Table 0.1 Calculation of the Average Weighted Score for Opinion Surveys

Survey Responses					
	Opinion = 1	Opinion = 2	Opinion = 3	Opinion = 4	TOTALS
Importance = 1	5	20	35	15	
Importance = 2	10	25	15	10	
Importance = 3	25	20	55	50	
Importance = 4	15	5	20	75	
TOTALS					

If the Excel spreadsheet version of the Handbook is being completed, **THIS IS THE ONLY DATA ENTRY THAT WILL BE REQUIRED.** The spreadsheet is programmed to automatically calculate the next stages and enter the average weighted score. If the paper version of the Handbook is being completed, a spreadsheet may be useful to calculate the weighted scores for insertion into the Handbook as described in the next stages.

Stage 2

Calculate the total number of responses in each row and column, denoting these $R_1, R_2, R_3, R_4,$ and $C_1, C_2, C_3, C_4,$ respectively.

Stage 3

Calculate the total number of responses and call this number the Grand Total (GT).

Survey Responses					
	Opinion = 1	Opinion = 2	Opinion = 3	Opinion = 4	TOTALS
Importance = 1					R_1
Importance = 2					R_2
Importance = 3					R_3
Importance = 4					R_4
TOTALS	C_1	C_2	C_3	C_4	GT

Here, the numbers are as follows, giving a GT of 400.

Survey Responses					
	Opinion = 1	Opinion = 2	Opinion = 3	Opinion = 4	TOTALS
Importance = 1					75
Importance = 2					60
Importance = 3					150
Importance = 4					115
TOTALS	55	70	125	150	400

Stage 4

The two indicators are now calculated:

Average importance of the characteristic: $\{(R_1 \times 1) + (R_2 \times 2) + (R_3 \times 3) + (R_4 \times 4)\}/GT$

Here this is $\{(75 \times 1) + (60 \times 2) + (150 \times 3) + (115 \times 4)\}/400 = 2.76$

Average opinion of the characteristic: $\{(C_1 \times 1) + (C_2 \times 2) + (C_3 \times 3) + (C_4 \times 4)\}/GT$

Here this is $\{(55 \times 1) + (70 \times 2) + (125 \times 3) + (150 \times 4)\}/400 = 2.92$



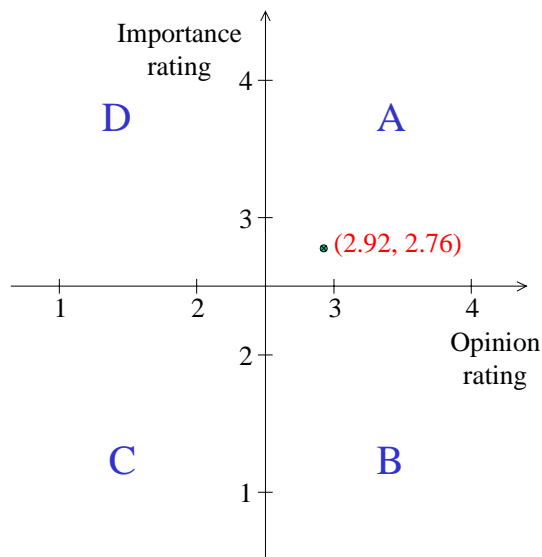
Interpretation of the weighted average scores

The reported scores must be considered as a pair.

How important is the characteristic to the respondents? If it is of above average importance to the respondents, then the average opinion rating will be more important to the operator than if the importance to the respondent was low.

The scores can be plotted on a graph using each pair of observations to make a single point. The example in Section 4.2 is plotted as follows:

Figure 0.1 Interpretation of Weighted Average Scores for Opinion Surveys



Observations in quadrants **A and D are above average importance** to the respondent (i.e. greater than 2.50). Improvement to any opinion rating would be worthwhile because the characteristic is important to respondents. Observations that fall in quadrant **D have a low opinion rating**, suggesting that improvement in this characteristic is needed. If the observation falls in quadrant **A, it has a good opinion rating**, so improvement is not likely to be as urgent.

In contrast, observations in quadrants **B and C are less important to respondents** (i.e. less than 2.50) and improvements to opinion ratings for these characteristics should take less priority as they are of less importance to respondents.

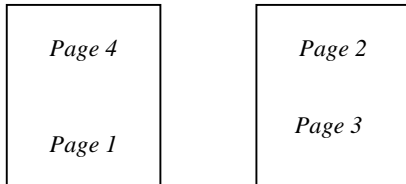
In this example the plotted point falls within quadrant A, so it is of above average importance to the respondent. As it has an above average opinion rating, improvement is not of immediate importance for the operator.



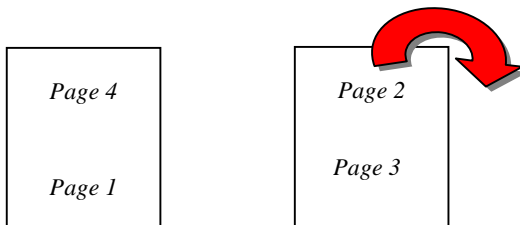
EXAMPLE LAYOUT OF QUESTIONNAIRES TO PASSENGERS and employees

The following pages give examples of surveys on passengers' opinions of services and employees' opinions of personal safety when working for the operator. The reproducible forms are prepared as follows:

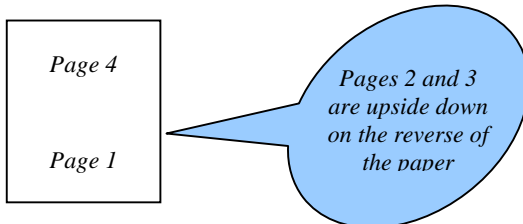
1. Photocopy the 2 sheets of the questionnaire on A4 paper.



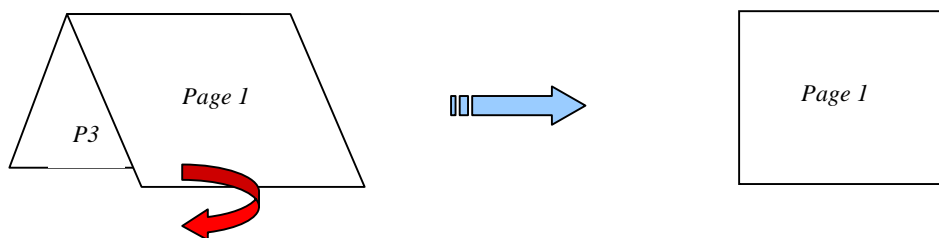
2. Rotate the sheet with *Pages 2 and 3* by 180°.



3. Photocopy these 2 sheets so that they are “back-to-back” on 1 sheet of A4 paper.



4. Fold the questionnaire in half so that *Page 1* appears at the front. The resulting A5 sized form enables easy handling on the vehicle and in the workplace.



Passenger Opinion Survey: Form to be completed by the Surveyor

Name of surveyor	
The date	
Time of day	
The route	
Origin of vehicle journey	
Destination of vehicle journey	
The location on the route (if part of the route is sampled)	
The number of passengers sampled	
The type of vehicle†	
Service reliability Indicate with a stroke [e.g. IIII II] the following at each stop:	
(A) Early by over 2 minutes	
(B) Delayed by over 5 minutes	
(C) Abandoned	
On time (i.e. not A, B or C)	

† Describe the vehicle according to the types for each mode used by EQUIP.

EASE OF OBTAINING INFORMATION ABOUT ROUTES, TIMETABLES AND FARES AND HOW UP TO DATE IT IS	How important is it to you?				How well are we doing?			
	Please rate this on the scale between 1 = no importance and 4 = very important				Please rate this on the scale between 1 = Poor and 4 = Excellent			
	1	2	3	4	1	2	3	4
21. Before travelling								
22. Telephone								
23. Internet								
24. At the bus/rail stops/stations								
25. On the vehicle								

EASE OF TRANSFER BETWEEN VEHICLES	No	Paperly ever	Some times	Often
26.a Do you have to travel on more than one vehicle in order to complete your journey?				
Please rate this on the scale between 1 = Poor and 4 = Excellent	1	2	3	4
26.b If you do make transfers, how convenient is this for you?				

Page 4

NAME OF OPERATOR

We are trying to improve our service to you.

Please try to answer the questions for the journeys you have made with NAME OF OPERATOR in the last 2 weeks – not just for this journey.

Put a cross in the boxes which tell us what you think.

Thank you for helping us by completing the questionnaire.

When you have completed the questionnaire, please add any other comments about our service:

Please turn over the page

Page 1

ON BOARD THE VEHICLE		How important is it to you?				How well are we doing?			
		Please rate this on the scale between 1 = no importance and 4 = very important				Please rate this on the scale between 1 = Poor and 4= Excellent			
		1	2	3	4	1	2	3	4
1.	State of repair and cleanliness.								
2.	Air temperature and ventilation.								
3.	Availability and comfort of seating.								
4.	Comfort of vehicle whilst it is moving								
5.	Standard of driving.								
6.	Ease of getting on and off.								
7.	Space for luggage, pushchairs, etc.								
8.	Punctuality of the service.								
9.	Courtesy and helpfulness of staff.								
10.	Staff knowledge.								
11.	Sense of personal security.								

Page 2

AT THE STATIONS/STOPS		How important is it to you?				How well are we doing?			
		Please rate this on the scale between 1 = no importance and 4 = very important				Please rate this on the scale between 1 = Poor and 4= Excellent			
		1	2	3	4	1	2	3	4
12.	State of repair and cleanliness.								
13.	Shelter from the weather.								
14.	Ease of moving around.								
15.	Waiting time.								
16.	Staff availability.								
17.	Staff knowledge.								
18.	Courtesy and helpfulness of staff.								
19.	Quality of the staffs' working clothes.								
20.	Sense of personal security.								

Please turn over the page for the remaining questions

Page 3

When you have completed the questionnaire, please add any other comments about your work:

PAGE 4

NAME OF OPERATOR

We are trying to improve your working conditions.

Put a cross in the boxes which tell us what you think.

Please return to a box provided by **NAME OF OPERATOR**.

Thank you for helping us by completing the questionnaire.

Your type of work:	Driver / Conductor	
	Station staff (e.g. inspector)	
	Maintenance / Ancillary	

Please turn over the page

YOUR PERSONAL SAFETY WHILST AT WORK		How important is it to you?				How well are we doing?			
		Please rate this on the scale between 1 = no importance and 4 = very important				Please rate this on the scale between 1 = Poor and 4= Excellent			
		1	2	3	4	1	2	3	4
1.	On the vehicle								
2.	At the bus/rail stops/stations								
3.	At depots/maintenance areas								
THE IMAGE AND POLICY OF THE COMPANY									
4.	The information, advertising and image strategy of NAME OF OPERATOR								
5.	The purchase of new vehicles as opposed to mid life vehicles								

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QUALITY OF THE WORKING ENVIRONMENT		How important is it to you?				How well are we doing?			
		Please rate this on the scale between 1 = no importance and 4 = very important				Please rate this on the scale between 1 = Poor and 4= Excellent			
		1	2	3	4	1	2	3	4
6.	The quality of working clothes provided by NAME OF OPERATOR								
7.	The quality of work place conditions (technical)								
8.	The quality of the vehicles used for public transport services								
9.	The quality of vehicle maintenance								
10.	Training to improve your skills								

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European Commission DG TREN
EQUIP Extending the Quality of Public Transport
Version Number 21
Dissemination Level Public
Date Prepared 26 June 2001

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The EQUIP Handbook for the self-assessment of the performance of local public transport services



Part II: The Indicators Full Indicator List: Bus



The EQUIP Handbook for the self-assessment of the performance of local public transport services



Part II: The Indicators Super Indicator List: Tram



APPENDIX 2: LIST OF EQUIP NETWORK MEMBERS

Country	Operator	Authority/Other Interest Group
Austria	Wilhelm Welsler Verkehrsbetriebe (bus) Stern & Hafferl Verkehrsgesellschaft m.b.H. (bus, heavy rail, tram) Steyr Stadtwerke (bus) Sabtours Reisebüro und Autobusbetrieb (bus) Grazer Verkehrsbetriebe (bus/ tram) Marazeck & Co Autobusbetrieb (bus) ROeEE-AG Raab-Ödenburg-Ebenfurter Eisenbahn AG (heavy rail) Firma Franz Zuklin & Co Busunternehmen (bus) Post AG UB Postbus Blaguss Busse (bus) Salzburg-Stadtwerke (trolley bus, bus) Salzburger Lokalbahnen SLB (heavy rail) Postbus (bus)	Fachverband der Autobusunternehmungen (chamber of commerce, bus-association) Fachverband der Schienenbahnen (chamber of commerce, bus-association) NÖVOG NÖ Verkehrsorganisationsges.mbH (tenderer for public transport, developer of masterplans, province of Lower Austria) VOR Verkehrsverbund Ostregion (transport-consortium) Amt der Kärntner Landesregierung Abteilung 17P - Straßen- und Brückenbau / Projektierung (provincial authority) Nahverkehr Errichtungs Ges.m.b.H (tenderer for public transport, developer of masterplans, province of Upper Austria) VVV Verkehrsverbund Vorarlberg GesbR (transport consortium) SVV Salzburger Verkehrsverbund Ges.m.b.H. (transport consortium) ABBV GmbH 6 Verbände (6 transport consortia)
Finland	Korsisaari Ltd. (bus) Koskilinjat Ltd (City of Oulu) (bus) Tampere City Transport (bus) Savonlinja-yhtiöt Ltd. (bus) Helsinki City Transport (bus, rail) Hyvinkään Liikenne Ltd. (bus) Koiviston Auto-yhtymä Ltd. (bus) Vekka Liikenne Ltd. (bus) Länsilinjat Ltd. (bus)	Ministry of Transport and Communications Provincial Government of Western Finland TransControl Ltd. Quality Plus (local PT quality project) Finnish Local Transport Association Finnish Bus and Coach Association Bussialan kehittämisspalvelut Ltd. (development and training) The municipality of Tuusula Provincial Government of Lapland
Italy [†]	ACT Reggio Emilia (bus) ACTV Venezia (bus) AMC Moncalieri (TO) (bus) ASP Asti (bus) ATC La Spezia (bus) CTP Napoli (bus) FNME Milano (rail) SAB Bergamo (bus) SIA Brescia (bus) AMG Gorizia (bus) ATAC-COTRAL Roma (bus and metro) ATAF Firenze (bus) ATVO S.D. di Piave (VE) (bus) CTNM Desio (MI) (bus) SISA Lodi (bus) <i>Other in Italian Network</i> STIB Brussels (B) (bus and metro)	Federtrasporti ANCI
The Netherlands	Nederlandse Spoorwegen B.V. (light rail) Rotterdamse Elektrische Tram (bus,	Ministerie van Verkeer en Waterstaat- Adviesdienst Verkeer en Vervoer (AVV) CVOV

Country	Operator	Authority/Other Interest Group
	tram, metro) Connexxion (Haarlem) (bus) VSN Groep-Connexxion (Hilversum) (bus) Stadsvervoer-Dordrecht (bus) Arriva (Heerenveen) (bus, light rail) Arriva (Groningen) (bus, light rail)	Mobis
UK + Ireland	Blackpool Transport Services Ltd (bus) Doncaster Community Transport (bus) Dublin Bus (bus) First Beeline Buses Ltd (bus) Go North East (bus) Lincolnshire Road Car Company Ltd (bus) Metroline Travel and London Northern (bus) Mike de Courcey Travel Ltd (bus) NEXUS (Metro) Nottingham Transport Services Ltd (bus) RingandRide, West Midlands (bus – demand responsive transport) Tanat Valley Coaches (bus) 1 other operator* <i>Others in UK + Ireland network</i> Budapest Transport Ltd, Hungary (bus, tram, Metro) De Lijn, Belgium (bus, tram, Metro) RATB, Romania (bus, trolley bus, tram)	Association of North East Councils Cumbria County Dundee City Hampshire County National Federation of Bus Users PAMBO Plymouth City West Sussex County Bill Clarke (NOVA benchmarking group) 1 other authority*

* denotes that membership of the EQUIP Network is confidential.

‡ EQUIP is working closely with the Quality Transport Pool (an association of public transport operators under the umbrella of Federtrasporti, the Italian association of public transport operators) which has 26 public transport operators from all over Italy, covering large, medium and small cities, as well as regional operators. The table shows operators which are directly participating in EQUIP.

APPENDIX 3: LIST OF RELATED PUBLICATIONS, JOURNALS AND CONFERENCES

Title of Paper	Publication	Date
Qualità totale e Benchmarking nel settore del Trasporto Pubblico	Trasporti Pubblici	October 1999
La Romania si rimette in moto, prossima tappa: l'Europa	Trasporti Pubblici	April 2000
The development of a self-assessment benchmarking Handbook for public transport operators. Seminar E, pages 91-104. Cambridge, UK	Proceedings of the Association of European Transport Conference	12 th September 2000
De potenties van een internationale benchmark; het voorbeeld EQUIP	Tijdschrift Vervoerswetenschap	In preparation
Benchmarking internal performance in European local transport operators	Transport Review	In preparation
Benchmarking internal performance	Traffic Engineering and Control	In preparation
The role of benchmarking internal performance and its relation to Best Value	Journal of the Chartered Institute of Transport and Logistics	In preparation
In progress	UITP review	In preparation

Annex 3, Table 1: Publications relating to EQUIP

Conference/Presentation	Location	Date
Pilot Conference	Brussels, Belgium	25 th October 1999
“Organisation of Transport and Quality of Service”, UITP Conference	Florence, Italy	29 - 30 th September 1999
FORTTRANS ‘99	Bucharest, Romania	16 - 19 th November 1999
Federtrasporti Conference	Florence, Italy	16 - 17 th December 2000
Brendon Hemily, Canadian Urban Transit Association	Washington (at TRB), USA	January 2000
Frank Cihak, American Public Transport Association	Washington (at TRB), USA	January 2000
UTSG Conference. Paper on the Development of a Self-assessment Benchmarking Handbook for Public Transport Operators.	Liverpool, UK	5 - 7 th January 2000
Dublin Transportation Office,	Dublin, Ireland	Various occasions
Nahverkehr 2010	Linz, Austria	2 - 3 rd March 2000
ECOMM 2000 (4 th European Conference on Mobility Management)	Bregenz, Austria	17 - 19 th of May 2000
Presentation to Caracas Metro	Caracas, Venezuela	May 2000
The Austrian chamber of commerce (department of rail-operators, department of bus-operators)	Vienna, Austria	14 th June 2000
CVOV	Rotterdam, Netherlands	11 th July 2000
Ministry of Transport-Department Market Liberalisation	The Hague, Netherlands	19 th June 2000
Singapore Public Transport Council	Singapore	9 th June 2000
Service Transport Workshop, The Finnish Coach and Bus Association	Hämeenlinna, Finland	August 2000
Connekt	Delft, Netherlands	4 th September 2000
Mobis-Committee of Economic Affairs	The Hague, Netherlands	October 2000
54 th UITP International Congress. Paper accepted entitled: The Development of a Self-Assessment Benchmarking Handbook for Public Transport Operators.	London, UK	May 2001

Annex 3, Table 2: Conferences/Presentations attended by EQUIP Consortium members to promote EQUIP