

AN EVALUATION OF THE USE PATTERNS OF A SPECIALISED

INFORMATION CENTRE IN BIODETERIORATION

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In the 1960s several Specialised Information Centres (SICs) were established in the UK to provide information services to workers in interdisciplinary subjects. The first SIC was the Biodeterioration Information Centre (BIC) and it has gradually developed a range of services for the biodeterioration community. Its service development was accompanied by investigations into BIC organisation and input but the present study is the first to evaluate BIC services and external effectiveness. By investigating service levels and use patterns the study examines the extent to which the BIC has contributed to the growth of the study of biodeterioration. The study also considers the hypothesis that BIC development can be used as a practical model to aid the development of information services in other subject areas: the working example of the BIC is used to identify general principles appropriate to other SICs.

BIC services investigated, through questionnaires and interviews with users and potential users and the services monitored are: Biodeterioration Research Titles, a quarterly bibliography, International Biodeterioration Bulletin, a primary journal, and the enquiry, photocopy and contract research services.

Results show that the BIC has benefitted from its links with the scientific community; that it has penetrated a significant proportion of its potential market; and that it produces a range of services capable of serving a variety of users, including industry, higher education and the general public. However, potential for BIC growth exists in certain industrial sectors and the developing countries, and the implications of this for future BIC growth and the growth of SICs in general is considered. Finally, the study shows that the BICs service range is more comprehensive than that of any other SIC and indicates that there is potential for future SIC growth in other subject areas, based on the BIC model.

Biodeterioration/Information/Use/Evaluation/Interdisciplinary

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Chapter 1

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1.1 Introduction

It is highly probable that any publication dealing with scientific information or scientific information retrieval will, at some point, mention the growth in scientific and technological activity and the generation of increasing amounts of information.

Most observers of scientific activity agree that this growth is exponential (Glass, 1962; Price, 1963; Meadows, 1974; Ashworth, 1971). Price (1963) for instance, suggests that the size of science measured in terms of manpower or publications tends to double within ten to fifteen years. Other writers, since, have generally agreed with this approximate measurement, (Meadows, 1974; Ashworth, 1971).

In response to this increase in scientific activity there has been a proliferation in information retrieval activities and services reflected in established information services reappraising their objectives and in turn altering the services and in the development of new processes of information transfer and the creation of new information services.

This thesis reports on the evaluation of one of the relatively newer information services, a specialised information centre. Specialised information centres developed particularly after the 2nd World War (Simpson, 1962) and generally catered for workers in interdisciplinary

fields of study which traditional information services could not serve adequately, (Martyn, 1970).

However, although the greatest rise in specialised information centre development was after 1944 it should be noted that such centres have been in existence since the nineteenth century Simpson (1962) referring to the U.S.A., states that thirteen centres were started in the late 1800's and up to 1940 specialist centres developed at a rate of one per year. He also states that in the early sixties there were approximately 400 specialised information services in the United States although a recent estimate (Harvey, 1976), puts the number at approximately 200. In the United Kingdom, at present, there are approximately a dozen such centres. Harvey (1976) points out that it is impossible to give an accurate estimate of how many centres exist and, when describing the situation in the United States, she states:

"nearly all those that have been documented in the literature are those that are federally supported, little being known about the majority of those run by non-government institutions or organisations or industrial concerns."

There is no doubt, however, that specialised information centres do exist in large numbers and their development has contributed to the apparent plethora of information services now available. Many observers have suggested that there is a superabundance of information services and have noticed the seemingly paradoxical

situation where many information services are underutilised despite the needs of scientists and technologists to keep abreast of an increasing volume of literature and information (Berul and Sayer, 1966; Swanson, 1966; Ladendorf, 1970; Line, 1970; Ashworth, 1971; Myers and Marquis, 1969; Pearson, 1973).

All of these observers report the significance of personal contacts and informal communication as a source of information. Berul and Sayer state that

"in reality libraries and information centres are used as the first source of information only 5% of the time," while Swanson hypothesises that:

"85% of useful scientific information is exchanged informally"

and a study of 567 innovations by Myers and Marquis (1969) showed that new ideas for innovation were evoked by printed material

"in only 7% of the cases."

It is important to ask, at this stage therefore, whether there is a need for specialised information centres. Are specialised information centres simply duplicating other services without adding anything to the efficiency and effectiveness of information provision?

To examine how unique or necessary specialised information centres are the next section attempts to give a general overview of the agencies and methods of information provision, and this is followed by a consideration of the

literature on specialised information centres.

The work reported in this thesis has involved an evaluation of the services of the Biodeterioration Information Centre, an example of a specialised information centre. It is hoped that the work will not only produce results of interest specifically to the administrators and users of the Biodeterioration Information Centre but that conclusions can also be made on the role and future developments of specialised information centres in general.

The final two sections of this chapter consider the Biodeterioration Information Centre, with firstly a description of the development of the subject, biodeterioration followed by an outline of the scope of the research work, reported here.

1.2 The Need for Specialised Information Centres

In the United Kingdom, public libraries, university and other higher education libraries, special and industrial libraries, research associations, external discipline-orientated services, specialist services and a variety of miscellaneous organisations collect, organise, and disseminate information to support scientific and technological activity.

Public library based information services for science and industry have become increasingly evident and Rowley (1971) has described the information services available to industry through public libraries with particular emphasis of local cooperative schemes.

However, with recent local government re-organisation no library authority has less than 100,000 potential users (Stockham, 1976) and when the general responsibilities to a wide variety of users are considered for public libraries it is obvious that any service to industry will have its limitations (Stockham, 1976). University libraries are essentially there to provide a service for the university in which they are located and the recent economies made in university expenditure suggest that maintaining this service could be a major problem and their major preoccupation.

The need to maximise funds may well result in other university libraries following the example of Warwick University where the library is offering a commercial

service to customers outside the university. At Warwick University the statistics collection and associated services are now available as a commercial service (Roberts, 1973).

Discussing the role of university libraries Roberts (1973) states:

"the deliberate assumption of extra-university responsibilities for a money return, on behalf of people called 'customers' would have been difficult to envisage ten years ago; now it seems part of an inevitable trend towards the closer integration of universities and their communities and a growing concern to maximise the use of resources."

Special and industrial libraries have been in existence since the nineteenth century (Ashworth, 1971) and the need for such services was officially identified by the creation of Aslib in 1924 (Burkett, 1972). To further serve industry cooperative industrial research stations were set up in 1915 (Ashworth, 1971) and from these, industrial research associations have developed often providing extensive information services to their members.

The development of the industrial research associations would seem to be particularly useful to those small firms which are unable to support a library or information unit. Bhattacharyya (1973), for instance, found only 700 libraries and information units amongst the plants of 82,000 small manufacturing firms.

The smaller firm has also benefited from various library regional cooperative schemes, the creation of industrial liaison centres in 1963, the attention of public and university libraries to technical services, and the establishment of Small Firms Information Centres (Ashworth, 1971).

Other services available include the large computer based services, such as Chemical Abstracts and MEDLARS created notably in the mid-sixties when exhaustive coverage of the literature was considered desirable and by some possible using computer technology (Licklider, 1965).

A glance at the publication, British Scientific Documentation Services (British Council, 1975) will show that a variety of smaller services are now operated, using both manual and mechanical methods by government departments, museums, professional associations, scientific societies, industrial firms, and commercial publishers and are available in the information market.

In turn, to support all these information activities there is the British Library, the Library Association, Aslib, the Institute of Information Scientists and various miscellaneous organisations, intergovernmental institutions and international organisations.

There have also been changes in publication methods such as the creation of synopsis journals (Williams, 1975), increasing attention paid to the role of reviews in

information transfer (Woodward, 1975) and attempts within the scientific community itself to improve communication through networks of 'invisible colleges' where scientists communicate informally with each other (Crane, 1969), and through the transmission of preprints to interested colleagues before publication (Swanson, 1966).

The brief description of the information environment given above is in no way intended to be comprehensive but it does give some indication of the range of services and activities evident at present. It is only appropriate to ask, therefore, at this stage whether there is a need for specialised information centres and what is their role in the process of information transfer.

The report of the United States Presidents Science Advisory Committee, Science, Government and Information (1963), usually referred to as the Weinberg report states that:

"a specialised information centre makes it its business to know everything that is being published in a special field; it collates and reviews the data, and provides its subscribers with regularly issued compilations, critical reviews, specialised bibliographies, and other such tools."

Generally, specialised information centres serve scientists and engineers working in interdisciplinary fields (Martyn, 1970^a). Workers in these interdisciplinary areas of study often face a dilemma when they attempt to obtain relevant information as many information services are

organised on disciplinary or industrial lines. It has been suggested that this disciplinary arrangement has been adopted for administrative reasons (Bottle, 1965) and as such does not reflect user needs. Specialised information centres therefore, seem to serve user groups not adequately catered for by other services.

Information is now also being published in a wide variety of forms - monographs, journals, theses, patents, standards, classified and unclassified reports, conference proceedings, handbooks, newspapers, preprints and other types of informal communication - while many services, particularly the large data-bases, do not cover many of these forms. Specialised information centres, however, in aiming to collect all information pertinent to a particular subject should also be collecting information in the variety of forms outlined above (Hornig, 1967).

Related to the publication of information in a variety of forms is the observation that scientists and engineers, or researchers and technologists as they are sometimes called, differ in their information requirements (Berul and Sayer, 1966; Allen, 1968; Ladendorf, 1970; Wood, 1971; Martyn, 1974). Wood (1971) states that although the research scientist uses mainly scientific journals and abstract journals, engineers are more likely to consult semi-published internal reports, trade publications, commercial journals or handbooks.

Martyn (1974^a) suggests that the disciplinary systems have also not catered for this difference in requirements:

"there are also documents which do not appear to fit easily into an existing disciplinary structure and these may not be collected until a new disciplinary service is organised to cover them. Also, because of the scholarly origin or archival intent of the major services there is sometimes a tendency to select by level, as well as by subject, which results in an apparent bias in favour of pure science as opposed to technology. Specialised information centres, therefore, should look to bridge the gap between the scientist and the technologist, which seems to exist in the provision of information."

On any attempt to provide a service encompassing the needs of scientists and technologists it is generally agreed that specialised information centres should be staffed by scientists and engineers, (Presidents Advisory Committee, 1963; Kent, 1965; Martyn, 1970^a, D.E.S. , 1971; Weisman, 1972; UNISIST, 1975). The Weinberg report (1963) stated

"we believe that the specialised information centre should be primarily a technical institute rather than a technical library. It must be led by professional working scientists and engineers, who maintain the closest contact with their technical professions and who, by being near the data, can make new syntheses that are denied those who do not have all the data at their fingertips. Information centres ought to be set up where science and technology flourish."

The staffing of centres with scientific workers should offer opportunities to the centres which have been denied

many other information services. Firstly, it should mean that the centres are in touch with the informal communication networks of the scientific community, through their staff. Haygarth Jackson (1973) suggested that formal information services were in competition with informal channels but other writers (Pearson, 1973) have expressed the hope that the formal and informal channels of information transfer will gradually come together. Theoretically, the specialised information centre is a type of information service that should achieve this.

The staffing of centres by scientists and technologists should also make such centres more responsive to user needs, and more accessible to potential users. Accessibility refers to the amount of effort required in choosing an information source, as stated by Allen (1966, 1968) who concluded that "perceived accessibility" and "perceived ease of use" of an information channel were more important to potential users than "perceived technical quality", (Allen, 1968). "Perceived accessibility" and "perceived ease of use" should be increased if a potential user knows that he will be talking with a subject specialist, that he will be given an analysed answer to his request, and that, if necessary, he can conduct a dialogue with the system, (Beruland Sayer, 1966; Line, 1970; Timms, 1967).

Finally, with the increasing amounts of information now confronting scientists and technologists, reviews of the literature are becoming increasingly important (Woodward, 1975). Specialised information centres, with their

appropriate staff, could become a major source of review publications. The importance of centres in this area is emphasised by Woodward (1975) who recommends that

"a study of the operations and success or otherwise of Information Analysis Centres as a means for professionalizing review writing and optimizing the use of scarce intellectual resources should be undertaken."

Theoretically, therefore, there seems to be a place for specialised information centres in the information transfer process. Observations on the role of specialised information centres, in practice, have been made with reference to the Biodeterioration Information Centre, - Chapters 4 to 8 -, and with reference to a sample of U.K. and U.S.A. centres described in Chapter 9.

The next section considers the literature relevant to specialised information centres and some of the advantages and problems of specialised information centres are elaborated.

1.3 Specialised Information Centres - A Literature Review

1.3.1 Definitions

Reference has already been made to the definition of specialised information centres given by the Weinberg report (1963) and the fact that such centres have been operational since the nineteenth century (Simpson, 1962).

However, particularly since the publication of the Weinberg report, a number of other publications relating to specialised information centres have appeared all giving their own definitions, (Kent, 1965; Simpson and Flanagan, 1966; COSATI, 1967; Darby, 1968; Abbel, 1970; Martyn, 1970; AGARD, 1970; DES., 1971; Weisman, 1972; UNISIST, 1975).

E.L. Brady speaking at a COSATI forum (1967) said

"an information analysis center is a formally structured organisational unit specifically (but not necessarily exclusively) established for the purpose of acquiring, selecting, storing, retrieving, evaluating, analyzing, and synthesizing a body of information in a clearly defined specialized field or pertaining to a specified mission with the intent of compiling, digesting, repackaging, or otherwise organizing and presenting pertinent information in a form most authoritative, timely, and useful to a society of peers and management."

The comments contained in OSTI - The First Five Years (DES., 1971) are particularly interesting as OSTI supported

a number of specialised information centres in the mid-sixties, including the Biodeterioration Information Centre. The report states

"By specialised information centre (SIC) is meant a centre which attempts to gather all the worthwhile knowledge within a specialised area and make that knowledge accessible to all who need it. This is an ambitious aim and can rarely be fully realised OSTI foresees that many of the supported centres, though still experimental, could develop into international centres for knowledge in their own fields. They could attract experts, who wish to write short articles or major reviews, they could build up sponsored research and consultancy work, and above all they could be excellent training centres for young scientists in the effective use of information."

Bering (1967) and Darby (1968) both outline the differences between specialised information centres and special libraries explaining that libraries provide documents or a list of documents in answer to an enquiry while specialised information centres respond to questions

"using pertinent information in any form as well as providing documents and bibliographies." (Bering, 1967). Darby (1968) also notes the broadened scope of acquisition which is a feature of specialised information centres compared to libraries and also notes the transitory nature of centres in that they exist only so long as there is a real need for them.

Given the transitory nature of specialised information

centres it could be argued that libraries are the most suitable place for centres to be established since a library can provide a permanent base. In the initial development of a centre the availability of documents and expertise in a library would facilitate centre growth and, if a centre were to close, its collection could be integrated into the library's collection to form a permanent source of reference after the centre's closure.

The above definitions emphasise the dual functions of information handling and information analysis carried out by specialised information centres. Centres carrying out these combined functions have often been referred to as "Information Analysis Centres" in order to separate them from those specialised information centres which do not have an information analysis function.

Most definitions equate information analysis with the regular production of compilations or critical reviews (Presidents Advisory Committee, 1963; COSATI, 1967, Passman, 1969; DES., 1971; Weisman, 1972), although in practice this is an oversimplification.

Firstly, even where a centre is not regularly producing compilations or reviews documents may be evaluated and excluded from its collection (Harvey, 1976). Similarly, enquiries can be answered with evaluated information: a literature search is carried out and the references obtained from this search are then evaluated for their usefulness in answering the enquiry and certain references may be removed.

In practice, therefore, there are some centres which carry out no analysis of their input and simply provide a document delivery service and at the other extreme there are centres where the input is continually evaluated and regular reviews or compilations are produced. In between the two extremes there are a wide variety of centres carrying out varying degrees of information analysis (Harvey, 1976). As a result, it must be admitted that it is difficult to produce working definitions of the terms "Information Analysis Centre" and "Specialised Information Centre" which clearly differentiate them.

The aims of all centres, whatever their title, seem to be basically the same; to collect, store and disseminate information in a specialised subject area. However no two centres are identical in their operations or services offered. The range of each centre's activities will depend particularly on the nature of the subject that it serves, the needs of its users, and its economic limitations. The general applicability of any definition in these circumstances will be limited.

Regarding the concept of information analysis therefore, only certain observations can be made. Firstly, it is generally agreed that the staffing of centres by subject specialists is a necessary prerequisite for any analysis functions, (Presidents Advisory Committee, 1963; COSATI, 1967; DES, 1971; Weisman, 1972). Secondly, information analysis seems to be equated with the preparation of critical reviews and compilations, and these services have

been developed particularly in centres in the U.S.A. Noticeably, the term "information analysis centre" is used extensively to describe centres in the United States while in the United Kingdom the term "specialised information centre" is usually used.

Some specialised information centres (S.I.C.s) are known as "specialised data centres" and the emphasis in these centres is on the collection, organisation, evaluation, and dissemination of numerical data. In practice, there are data centres dealing solely with quantitative data, producing output in perhaps tabular or graphic form, and there are also data centres dealing with information in a much broader sense producing not only data compilations but also bibliographies and other document related services. It is reasonable to expect a centre to deal with both data and information if both are applicable to the subject field which the centre is serving.

Throughout the text of this thesis the phrase "specialised information centre" will be used in preference to the other phrases described in previous paragraphs.

1.3.2 Staffing and Location

All the definitions also stress the importance of subject specialists to a specialised information centre. Certainly it seems logical to employ scientists or engineers to a large extent in specialised information centres particularly where great emphasis is placed on the analysis and evaluation of information. It is also

important, however, that operators of a centre should be aware of the most suitable information storage and retrieval methods and there is therefore a place for trained librarians and information scientists in these centres (COSATI, 1967).

The apparent need for subject specialists to be involved in the activities of a specialised information centre emphasises the importance of the environment of such a centre. The ideal location for the establishment of a centre is where active research in the subject of the centre is being carried out. Many centres have been established in government, research institute, and university locations where advantages accrue from the existence of large and varied communities of expertise and from the existence in most of these locations of established library facilities which allow for liaison between centre personnel and information specialists.

Another advantage of locating a centre where research flourishes is that members of the centre may become directly involved in research work and as a result, the centre will not only be acting as a secondary information source but will also be contributing new information directly to the subject study and enhancing its position within the subject. This involvement of a centre in research work may even lead to research and consultancy services becoming regular services of a centre. The direct involvement of a centre in the study of a subject and the growth of contract research services should increase the economic

stability of a centre.

The establishment of a centre at a university also should provide benefits to the university in that the services of a centre are readily available to members of the university, external workers are given an idea of the activities of the university through the centre, teaching and research functions may be carried out by the staff of the centre and funds are attracted to the university (Lunin, 1969). The university can also offer the facilities for conferences and seminars while its students and staff, through contact with an information centre, can be trained in the problems of information retrieval.

1.3.3 Costs

A major problem for specialised information centres is that not only are the markets for their services relatively small but often these markets are ill-defined because the subject is in its early stages of development, (Willsher and Eggins, 1969). The subject's development, of course, may well have been retarded by the previous lack of any information service in that subject. Where subscriber numbers to centres vary from as little as one hundred to a few thousand covering the costs of a centre's operations alone is often difficult. The options are to either charge for a centre's services, obtain a subsidy, or operate a system which combines these two.

Of course problems of finance occur with most information services and the situation is complicated in

many countries where public and private financing of information services co-exist (Schwuchow, 1973; Cooper, 1972). Schwuchow describes the situation in most industrialised countries of the west where information is viewed as a national resource and where the "principle of primary public financing of information centres" (Schwuchow, 1973) is followed but not total public financing. Certain basic facilities are financed from public funds but reasons do exist for private financing, these being:

"the possibility of making profits in certain areas by providing scientific and technical information, the common interest of industry and public institutions in information services in many sectors, and the limitations of public budgets." (Schwuchow, 1973).

Public financing of services is usually defended on the grounds that the information is a "collective good": that is, it is an important national resource and could only be offered by private economic interests on the market at prices so high that significant potential user groups would be excluded from its consumption (Schwuchow, 1973).

The proponents of fees covering all or part of the costs of information services suggest that where possible users must bear at least part of the cost of these services, that charging will allow the regulating factor of user criticism to directly influence the quality of the information service, and that expenditure on information anyway can only be charged to a limited extent to the public budget (Cooper, 1973; Schwuchow, 1972).

Whatever the arguments regarding the financing of information services the present situation does create one major problem in that the availability of free or indirectly charged information services is likely to produce an underestimation of the value of information by the users of information (Penner, 1970). Interestingly, in other areas where information is provided - by lawyers and surveyors for instance - users do not expect to obtain this information free of charge.

Within the information environment, therefore, which encompasses sophisticated data bases, public libraries, and personal contacts and colleagues, it is important for specialised information centres to emphasise the uniqueness of their services and the need for their services before any charging policy will be successful.

Problems will still remain however: for instance, to achieve economic stability a centre may charge such a high price that it prices itself out of the market. Even where users are willing to pay for a service they might not be in a position to do so because of, for instance, inability to persuade the suppliers of funds to pay for the services (Martyn, 1970^a). This may be a particular problem where potential users of a centre are likely to come from the public sector.

Martyn (1970^a) suggests that centres should aim to be self supporting after four and a half years although Wiesman (1972) questions the view that specialised information

centres are capable of self sufficiency:

"more often than not experience has shown that the view that user charges can support a substantial portion of the operating costs of a center is overtly optimistic. Some information services/centers, though serving an international community have a total user audience of only a few hundred. The field of such a community of users may be of utmost scientific importance but in the number of workers it is exceedingly small. An information service/center serving a small universe of users would price itself out of existence if it depended on user charges for a substantial portion of its support."

Of course, how far user charges can contribute to the support of a centre will differ from subject to subject and from centre to centre depending on the range of services offered; even with a small number of users, if a centre can offer consultancy and contract research services it will obviously increase the potential amount of income it can obtain from user charges.

Most information services catering to dispersed audiences can usually only reach a small percentage of their potential users. Various percentages have been suggested ranging from 50% (Weisman, 1972) to 20% (Martyn, 1970^a). For specialised information centres serving small markets regular publicity and marketing is vital if they are to reach an appreciable percentage of the workers in their subject fields. The staffing of centres by working scientists will be useful here as these individuals through

their participation in meetings and conferences can publicise a centre and therefore complement the formal publicity methods.

The alternative to a charging policy is a subsidy. A subsidy is particularly appropriate where there is a definite need for the information but the information cannot be provided efficiently on market economy principles. This need is often expressed in terms of national or international requirements and is sometimes stated by individuals working in a particular subject area and sometimes by national or international organisations involved in scientific and technological administration.

A subsidy may be particularly appropriate where the users of a centre have a definite need for the centre's services but are unable themselves to pay for it. Similarly, where user numbers of a centre are very small but the area of study considered important, a subsidy may be the only way to maintain the centre.

A combination of the two alternatives is also possible with a centre being supported in the initial stages of its development but then, when its services have developed sufficiently and its activities become relatively well known and used, moving towards some degree of financial self sufficiency (Martyn, 1970^a). It is important to plan adequately for the financial policy changeover and if necessary to evaluate how far the market will be reduced by a charging policy. McLintock (1968) and Barkla (1973)

have questioned users in this respect before and after a change in charging policy.

Where markets are ill-defined or unstable it becomes a matter of economic necessity to evaluate continually the products and services provided. The willingness of organisations and individuals to pay for a service is in itself a reflection of the value placed on that service by its clients.

Unfortunately, willingness to pay does not give any indication of why the service is of value, in what way the service is of value, and whether it will continue to be of value. To answer these questions more detailed evaluation is required and the nature of the organisation of specialised information centres often makes such evaluation impossible: evaluation studies can be costly and time consuming and for many specialised information centres all resources must be devoted to producing their regular services and hence any detailed evaluation study by centre staff is out of the question (B.I.C., 1970).

However, where extensive evaluation can be carried out and the user included in this evaluation then the presence or absence of a charging policy has particular significance. Firstly it is likely that users of a service will be more willing to offer objective criticisms of this service if they are paying for it (Schwuchow, 1973). Secondly if users' needs and suggestions are then incorporated into future service charges and developments a centre should be assured

of continued user support and hence economic viability. In practice it is not quite as simple as this as users have conflicting needs and, how far users' suggestions can be incorporated into any future service will depend on the extent and nature of these conflicting needs.

To end this section on an optimistic note one advantage of a small organisation is its flexibility and adaptability. Writers on industrial organisations have emphasised this point (George, 1971). The regulating function of user opinion therefore should be especially effective with regard to the operations of specialised information centres. In comparison, the larger information services and data bases can be administratively cumbersome and may be less adaptable to changing conditions particularly when large amounts of money are committed to new systems which by their nature are impossible to alter radically at a later date (George, 1971). The implications in terms of economics are obvious and should provide considerable comfort to the operators of small specialised information services.

1.3.4 Specialised Information Centres in the U.S.A. and the U.K.

Harvey (1976) mentions the difficulty in identifying specialised information centres and hence estimating their numbers. In the U.S.A. however, a directory of federally supported information analysis centres is produced regularly which to some extent alleviates the difficulty (COSATI, 1968, 1970). Up to 1974 this directory was sponsored by a COSATI panel

on Information Analysis and Data Centers which also regularly organised forums, and conferences on such centres, (COSATI, 1967, 1972). Since 1974, however, the panel has ceased to exist and the most recent directory was sponsored by an 'ad hoc' COSATI panel (COSATI, 1975).

In the United Kingdom there is no organisation exclusively concerned with specialised information centres. In 1965, the Department of Education and Science through the Office for Scientific and Technical Information (O.S.T.I.) began supporting for an experimental period five specialised information centres and one specialised data centre (Robertson and Reynolds, 1969; DES, 1971). Since then a number of other centres have been established through grants from various organisations and their operations and services are outlined in a number of directories (Royal Society, 1974; British Council, 1975; Aslib, 1975).

Special note should be made of the continued interest of the information community in the role and development of specialist centres represented by the recent establishment of a UNISIST working group on Information Analysis Centres, (UNISIST, 1975).

In the U.S.A. there are approximately 200 centres (Harvey, 1976). The majority of these are federally supported and serve small user groups engaged on a particular project or series of projects. These have been referred to as "mission orientated" centres, (COSATI, 1967) and when

a project ends the centre is also often closed with its document collection being integrated into a larger information system (Darby, 1968).

The centres are usually located near the user groups they exist to serve and virtually all are staffed by subject specialists (Harvey, 1976). The majority of centres can be described as "information analysis centres" performing regular analysis and evaluation tasks. Staff numbers vary from centres with two or three staff to centres with over 100 staff (Simpson, 1962; Harvey, 1976).

In the United Kingdom operations are on a much smaller scale with approximately a dozen specialised information services which do not identify with any specific discipline or industry (Harvey, 1976). The majority are located in universities or government research establishments. The centres are much smaller than in the U.S.A. with most centres employing between two and ten persons, but most centres have the involvement of subject specialists although in many cases they are not involved in the day to day running of the centres (Harvey, 1976). Most centres operate a charging policy although very few are totally self supporting as overhead costs are often paid for by the accommodating institution (Martyn, 1970^a).

1.3.5 Evaluation

Many evaluation studies of information centres and services are of only limited general interest because of the unique local conditions which they often investigate

and, as a result such studies do not appear in the formal literature. Nevertheless, a number of studies relevant to specialised information centres have been published and these have usually been studies of particular centres although one or two general studies have also been carried out. The studies are described in this section.

Firstly, mention should be made of an article by Wooster (1970) in which he surveyed the position of information analysis centres in the U.S.A. Although the article does not report any actual evaluation work Wooster does list, in order of priority, a number of criteria which he suggests should be used in evaluating centre effectiveness. These criteria are given in Table 1 and it is hoped to cover most of these criteria, to some degree in the report of the study of the Biodeterioration Information Centre to follow in later chapters.

A significant general study of specialised information centres has been carried out by Sternberg (1971). Sternberg investigated the use of federally supported information analysis centres by special libraries in large companies in the U.S.A. In this investigation a questionnaire was mailed to all libraries of the top 1,000 companies in the U.S.A. and of the respondents - there was a 70% response rate - 24% said they used information analysis centres.

The major reason given for using these centres was that they provide "supplementary services" and Sternberg concludes that the centres provide "unique publications"

such as reviews and state-of-the-art reports which are the major "supplementary services". According to the study, non-use of information analysis centres was due to the absence of any centres in subjects covered by particular libraries, the information given by centres being available elsewhere, and the unawareness of the existence of a particular information analysis centre. The cost of a centres services is not considered an important factor in determining usage of centres although, as Sternberg suggests, many of the centres provide free services anyway due to their federal support.

Other interesting points made by the study are that no library found any significant money, time or staff saved by the use of a centre and that the availability of hard copy documents at a centre was unimportant in the decision to use a centre.

In conclusion, Sternberg recommends that, considering the apparent low use of centres, centres should indulge in more advertising, improve their services and in particular produce more state-of-the-art reviews.

The study is important in that it attempts to measure the effectiveness of information analysis centres, in general rather than investigate the impact of a specific centre. However, queries can be raised regarding the methodology of the project. For instance, there may be differences in use patterns between libraries, the study population chosen, and other users of centres such as

individual scientists and engineers, not covered by the study and in consequence some of the results of the study may have limited general validity.

The study also, is limited to an investigation of the top 100 large companies in the U.S.A, on the assumption that these companies are the major users of information analysis centres. This assumption is arguable and a consideration of smaller organisations who use centres may well have significant effects on the results obtained. Costs of services, for instance, may become more important factors in centre use decisions while similarly "hard copy availability" (Sternberg, 1971) at a centre may be important to a small firm, without a large information unit and without strong links with the national information network.

These points should be borne in mind when considering the Biodeterioration Information Centre not only because the Centre serves a wide variety of organisations and individuals but also because the Centre's administrators have emphasised the need to supply an adequate service to smaller firms which form an important part of the total industrial effort concerned with biodeterioration, (Eggin, 1975).

In the United Kingdom, Aslib carried out a study, commissioned by OSTI of five specialised information centres in 1969, (Robertson and Reynolds, 1969). During the study information was collected on the aims, objectives,

methods, organisation, staffing, and services of the centres and this information was published in an essentially descriptive report so that organisations and individuals involved in the establishment and development of new centres could benefit from the experiences of the five centres studied, (Robertson and Reynolds, 1969).

Regarding specific centres, studies have been carried out to assess the need for and priorities in proposed centres and services, (Feinler, Cook, Heinz and Bourne et. al. 1965; Wolfe and Herner, 1967), and one study carried out a "postmortem" on a centre after its operations had been discontinued, (Dougherty, 1964).

Feinler, Cook, Heinz and Bourne et. al. (1965) questioned scientists carrying out research in atomic and molecular physics concerning a proposed information centre for atomic and molecular physics. Concern was expressed by the scientists over the lack of communication between a literature searcher and the scientist requesting the search and Feinler states

"it was emphasised that ways must be found to organise the center so that it would remain under scientific guidance and be closely associated with an active and respected research group; under no circumstances should it simply pour out unorganised lists of references or unevaluated results."

Also in this study approximately one third of the respondents volunteered to contribute some of their time

to assisting in the production of the proposed centre's services.

Two studies of the methods of specialised information centres provide little support for the view of Rowlett (1972) who suggested that information analysis centres should use the entries produced by the large computerised discipline orientated secondary services as the basis for their services but both Snider (1972) and Martyn (1974^a) provide evidence to show that, in practice, this is not always efficient. Snider (1972) found a low use of external abstracting and indexing services by the Air Force Machinability Data Centre because of the language barrier between the abstractors of the external services and the actual terminology used in the material removal industry.

Martyn (1974^a) examined a year's input to the Biodeterioration Information Centre and investigated how far this input was covered by five computerised secondary services, including BA previews and MEDLARS. He concluded that even if all five services were subscribed to, 21% of the input would still not be obtained.

Regarding user studies of specialised information centres, a number of studies have been carried out on the various SDI outputs produced by such centres, notably in the United States. Kokoropoubus (1968) and Thuronyi and Pietkiewicz (1970) stress the importance of continuous feedback as an evaluative mechanism for an SDI service while occasional studies have been carried out by Buchanan

and Hutton (1967), Scheffler(1971), and Freeman (1971).

These three studies concentrate on the evaluation of SDI services produced by three specialised information centres in terms of the "relevance" and "recall" capabilities of these services. Their main aim has been to improve the profile construction for users and modify output according to user needs and as such they have limited general interest beyond the environments of the three centres.

Klinger (1966) carried out a user evaluation of the enquiry service of the Aerospace Materials Information Centre and other user studies have been carried out by Grawelska (1968), McLintock (1968), University of Aston (1971), Amba and Rau (1971) and Barkla (1973):

These studies have concentrated on user evaluations of bibliographies produced by the various centres and have attempted to discover the use to which bibliographies are put when they are obtained by a recipient and to obtain user assessments of the publications in terms of format, entry depth, coverage and timing. There has, therefore, been a strong practical aim to these projects in that user evaluations can provide guidelines and suggest priorities for future service charges and development. In this respect it is hoped that the evaluation of the services of the Biodeterioration Information Centre reported in this thesis has produced results which will similarly be an aid

to decisions on future service developments.

The studies outlined above, however, have only contacted users and asked them for details of their use patterns and their allied use priorities such as whether they would be willing to pay more for indexes, abstracts or a more regular service.

This type of user study is of value although it does not include two important elements. Firstly, there is no attempt to study the subject itself which the centre caters for and relate activity within the subject to use made of a centre, and secondly, no studies have looked at why potential users who contact a centre, in one form or another, for example with a general enquiry or with an occasional technical enquiry do not become regular users of a centre. An attempt has been made to incorporate both these areas of study into this project.

1.4 The Scope and Importance of Biodeterioration

1.4.1 Introduction

The first specialised information centre supported by O.S.T.I. in 1965 was the Biodeterioration Information Centre set up in the Department of Biological Sciences at the University of Aston in Birmingham. A study of the use patterns of this Centre is the major feature of the research reported here and a detailed account of the establishment and growth of the Centre is given in Chapter 4. The need for the establishment of the Biodeterioration Information Centre has been due to the growth of biodeterioration as a serious problem, and an overview of the subject of biodeterioration is given in the following section.

1.4.2 Biodeterioration

Definition

Biodeterioration has been defined as

"any undesirable change in the properties of a material caused by the vital activities of organisms." (Hueck, 1965). It therefore, covers a wide range of materials, organisms and conditions. Examples of biodeterioration include the rotting of wood by fungi, the growth of fungi and algae on concrete and paint surfaces, the fouling of ships and marine constructions by barnacles and molluscs, the attack on paper, textiles and grain by insects, the destruction of stored products and pipelines by rodents and bird hazards to aircraft.

The above examples show the extent of the coverage of biodeterioration and it is important to emphasise that a biodeterioration process is involved in one of three types of biological attack on a material: fouling or soiling, mechanical damage, and chemical attack (Hueck, 1965; Butler and Eiggins, 1965; Allsopp, Eiggins and Hollingsworth, 1973). With fouling or soiling it is the presence of organisms which impair the functioning of materials. The presence, for instance, of barnacles and other fouling organisms on ship's hulls reduces the speed and increases fuel consumption. There are also unpleasant aesthetic effects often caused by the soiling activities of organisms. The growth of fungi on soap particles on shower curtains and walls or bird droppings on buildings are examples (Allsopp, Eiggins and Hollingsworth, 1973).

Mechanical deterioration takes place when physical damage is caused to a material by organisms which are not using the material as a source of food. Rodent attacks on pipes and electrical cables fall into this category.

Chemical damage include assimilation where the organisms use the material as a source of food and dissimilation where substances are excreted by the organisms onto materials. Examples of the former are the growth of bacteria and fungi on stored food and the latter includes the damage to rocks by lichens and the etching of lenses by acids liberated by fungi.

A term allied to biodeterioration is biodegradation.

Biodegradation encompasses

"the activities of organisms in the environment which break down wastes liberated by man but without his involvement." (Allsopp, 1976). Allsopp (1976) also suggests the term "applied biodegradation" defined as

"man's harnessing of the decay abilities of organisms to render a waste material more acceptable or to convert a waste material into a useful material." This concept of biodegradation, as a process generally useful to man, is widely used and includes examples such as the composting of town wastes or the fungal growth on wastes to produce protein.

Biodeterioration, therefore, is considered as a process producing negative and undesirable effects while biodegradation often produces results which are welcomed by man and useful to his economy (Allsopp, Eggins and Hollingsworth, 1973).

Importance

The significance of biodeterioration has obviously increased with the growth in industrialisation and the increasing amounts of manufactured materials now available. Standards are continually increasing and even a small defect in a manufactured good caused by biological attack is much less acceptable than a similar flaw in a raw material. Allsopp, Eggins and Hollingsworth (1973) highlight this increased significance of biodeterioration as materials become more highly processed, by the example of one maggot in a large bag of fruit being quite probably acceptable but that the same fruit processed into a can of

pie filling at four times the price would be rejected due to the presence of the same maggot, even though harmless in itself.

Biodeterioration is of particular importance in the tropical countries due to their humid environmental conditions, low use of control measures and the major exports of these countries being raw materials of vegetable or animal origin which are particularly susceptible to fungi and bacterial attack (Butler and Eggins, 1966). Supply of raw materials in these countries is often also more critical than in the developing countries. However, although traditionally the main concern in these countries was with the spoilage of raw materials and food products the increasing technological and economic development of these countries - they are not only producing their own goods but also becoming important export markets for manufactured goods - means that a wide variety of finished products are susceptible to biodeterioration in these areas. Plastics, mineral oils, metals, rubber and optical and photographic equipment are examples of the newer materials and products being increasingly used in the tropical developing countries and the problems of their biodeterioration and its prevention and control in these areas is well documented, (Butler and Eggins, 1966; Eggins and Mills, 1971).

The importance of biodeterioration is also increased by the difficulty of assessing the susceptibility of a particular material to biological attack, the difficulty

of identifying the deteriorating agent or agents, and the difficulty of deciding on the most suitable preventing or controlling agent. Very often, there are many organisms present in a deteriorated material but not all will be responsible for the attack and it is imperative to identify the real deteriogens before carrying out specific preventive or remedial treatments which will only be effective against certain deteriogens (Allsopp, Eggins and Hollingsworth, 1973).

Cost

There are difficulties in costing biodeterioration. Firstly, statistics in areas where biodeterioration exists are not always available. Eggins (1967) states two prime difficulties in assessing cost:

"the difficulty of persuading biologists who do understand biodeterioration to be interested in its economics and the difficulty of non-biologists in recognising biodeterioration when they see it." A further complication is that many manufacturers are reluctant to admit that biodeterioration is a problem affecting their products. Hueck-van der Plas (1965) estimated economic losses due to biodeterioration to be US \$1,000,000,000 annually. Allsopp (1973) quoted up dated figures from Hueck- van der Plas and estimated the annual world loss to be 4×10^9 US dollars. Allsopp noted that these estimates did not include losses of stored foodstuffs or the fouling of ships hulls but he added that estimates for the latter case of biodeterioration, according to the T.N.O. organisation in Holland were in the region of 10×10^6 US dollars per year on a world scale.

The Development of Biodeterioration as a Subject of Study

The growth of manufacturing activities has certainly involved an increasing number of people in activities related to biodeterioration activity, prevention, and control. Eggins (1967) described biodeterioration as a "meeting point technology involving biologists, biochemists, analytical chemists, economists, environmental engineers and material scientists."

Although interest in the problem of biodeterioration has grown, however, with technological development, it should be noted that biodeterioration is by no means a recent phenomenon. Hueck (1965) quoted several references in Pliny's "Natural History", for instance, in regard to the breakdown of wood. While Eggins (1970) stated that the earliest work undertaken on general biodeterioration problems was in the late 1920's when Dr. Bunker worked on general "spoilage problems".

The first coordinated activity in regard to biodeterioration as a whole, was the setting up of the Prevention of Deterioration Centre immediately after the Second World War in Washington, while in the 1950's Eucostar activities were aimed at trying to standardise some of the test methods for biodeterioration protection (Eggins, 1970). Similar attempts have also been made by the I.S.O. (Eggins, 1970).

Increasing interest in the study of the biodeterioration of materials was reflected in 1962 when the Committee for Scientific Research of the Organisation for Economic Co-operation and Development proposed a co-operative study on the biodeterioration of materials. The resulting O.E.C.D. expert group set up five special task groups: taxonomy, textiles, plastics, ecology and documentation, (Hueck-van der Plas, 1965). One of the major objectives of the group was to encourage research, including co-operative research and to find and standardise suitable test methods.

With any research project it is necessary to keep up with the literature and the group, therefore, began to collect references from its members and then shortly afterwards, Dr. Eggins, a member of the group, established the Biodeterioration Information Centre in Birmingham in 1965 with the aid of a grant from the Office of Scientific and Technological Information (O.S.T.I.), and this Centre took over the role of collecting, processing and disseminating biodeterioration information.

Previously, the Prevention of Deterioration Center in the U.S.A. had carried out the above functions but the Centre closed in 1963, due to lack of funds.

1.5 Scope of Research

1.5.1 Introduction

Earlier studies at the Biodeterioration Information Centre have included investigations of the input of the Centre (Willsher, 1969; Martyn, 1974), and an investigation of the internal organisation of the Centre (University of Aston, 1968). This study can be viewed as a follow on from these studies and attempts to examine the effectiveness of the Centre from the point of view of the user by

1. Examining the distribution of the study of biodeterioration and estimating how far the Centre is serving and influencing this distribution.
2. Observing the actions of Centre users through an examination of the subscriber, enquiry, photocopy, and other records at the Centre.
3. Contacting (a) users of the Centre for information on their patterns of use and for their evaluation of the Centre's services and (b) non-users of the Centre to discover their reasons for not using the Centre as an information source.

1.5.2 Hypotheses

A number of linked general hypotheses form the basis of the research work and these are outlined below:

1. Biodeterioration as a subject study is concentrated in only a small number of geographical areas.
2. The Centre has continually benefited from its connections with the biodeterioration scientific community.

3. The use patterns of the Centre's services vary significantly between different geographical and cultural areas.
4. The Centre has reached its maximum obtainable user numbers.
5. The Centre's organisation and services are representative of the general operations of specialised information centres in the United Kingdom.

1.5.3 Thesis Outline

The following chapter of the thesis (Chapter 2) describes the methodology used to investigate the general hypotheses outlined above. Chapter 3 describes the study of biodeterioration activity internationally.

The establishment and growth of the Biodeterioration Information Centre from 1965 to 1975 is generally outlined in Chapter 4. The results of the investigation into the use patterns of the Centre's information services are detailed in Chapters 5, 6 and 7.

Chapter 8 considers the future of the Centre and includes the study of potential users of the Centre.

In Chapter 9 the activities and services of the Biodeterioration Information Centre are compared with other specialised information centres particularly those in the United Kingdom and the role of specialised information centres in the information disseminating processes of the future considered.

The conclusions resulting from the work are discussed in the final chapter, Chapter 10.

Table ISuggested Criteria for Evaluating Centre Effectiveness

1. What percentage of possible users does the IAC serve?
2. What is the cost of making a search?
3. Does the retrieval system provide the proper amount of exhaustivity and selectivity.
4. What are the economic or "opportunity" costs that would be incurred in the absence of the IAC?
5. Do scientists in the field believe that the IAC meets their needs?
6. To what extent do references to the service provided by the IAC occur in the literature of the field?
7. Outline of specialised reports.
8. Professional qualifications of manager/staff.
9. Does it meet the specific needs of the sponsoring agency?
10. Percentage of repeating users. Are these regularly surveyed to determine adequacy of information provided?
11. Were prospective users surveyed before centre was started?
12. What alternative sources of information would be available to users if the IAC were abolished?
13. How much interaction is there between users and IAC staff in formulating questions and evaluating answers?
14. Does the IAC have an outside advisory board? Does it use them or are they just window dressing?
15. What are their relations to other IACs. Do they refer questions to other IACs, receive questions from them? What is their balance of trade with other IACs?

16. Do they exchange computer programs, vocabularies with other IACs? Is there any attempt at networking?
17. Are the detailed unit operations efficient? - acquisitions, indexing, storage, retrieval, output, formatting etc. How well do they know their unit costs? How do these compare with other IACs?
18. What is the rate of use of documents and other information resources involved in the centre?
19. How willing are the customers to pay for the service provided?
20. Which came first - the IAC or a demonstrated need for its services?
21. How sharply defined is the field that the centre covers?
22. Does the centre take advantage of available services for information retrieval, including the IAC's?
23. Is the storage system reasonable in view of the available hardware and file size?
24. Are micrographic storage and dissemination methods used widely?

From: Wooster (1970)

Chapter 2

Methodology

2.1 Introduction

2.2 Use Studies

2.3 B.I.C. Use Study

2.4 Conclusion

2.1 Introduction

In the previous chapter the need for specialised information centres was emphasized and now this chapter presents an overview of the particular approach, and its associated problems, adopted in this study of a specific specialised information centre, the B.I.C. This overview is not concerned with specific details of the methodology used such as the various questionnaire designs, the samples chosen or the response rates to various studies as these details are given along with the respective results of the studies in the chapters to follow. Rather, it attempts to consider generally the philosophy and relative merits and disadvantages of use studies, presents some arguments on why a use study of the B.I.C. is necessary and outlines generally the areas investigated in this particular study.

2.2 Use Studies

The report of a Royal Society conference on "Scientific Information" in 1948 (Royal Society 1948) contains a report of an early attempt to contact working scientists to discover their use of the scientific literature (Bernal 1948) and a paper by Urqhart reporting on a questionnaire study of users of the National Lending Library.

Despite this interest in use patterns nearly thirty years ago, however, it seems to have taken a considerable

time for service operators to accept the importance of user studies and where studies have been carried out they have often been criticised on methodological grounds and for their lack of general significance (Wood 1971, Nan Lin and Garvey 1973, Snow 1973, Martyn 1974, Swanson 1975,)

Snow (1973) has criticised the organisation of information in the architectural field describing it as "representing something of an administrative convenience which ignores the abilities and needs of information users". In criticising the assumption that the structure of information systems can be determined by service operators, she contends that "efficient use of information will not be effected while the requirements of users go largely uninvestigated and while the user is inundated with increasing numbers of publications and systems for information retrieval that the user himself has to operate".

Similarly the large investment in the ERIC information system in the U.S.A. has been criticised by Nan Lin and Garvey (1973) because it was not accompanied by any significant empirical investigation. They state "it is therefore quite disturbing in our review to find few innovations being implemented that have a built in feedback component to provide information about the actual users and responses of the potential users to the planners and administrators of the innovations".

In a recent review Martyn (1974) describes three time periods of use studies and suggests that only in the third period from the late sixties up to the present have use studies concentrated on specific systems: during the first time period in the 1950's studies were concerned with the general information gathering habits and needs of users while the second time period in the mid-sixties was characterised by the use of more sophisticated techniques and sociological methods. Martyn (1974) adds that in both these periods the results had "little direct effect on the designers of systems". The third period, however, has produced studies which "are directed towards the setting up or, more frequently, the modification of a specific system or the illumination of a particular problem area" (Martyn 1974).

The indications are that there has been a definite growth in user investigation over recent years and particularly user evaluation of specific services (Wood 1971, Martyn 1974, Ford 1977). Unfortunately, the growth in user surveys, apparently desirable in itself, has not taken place without criticism. A major criticism levelled against many use studies is that methodological deficiencies have severely restricted the value of the results obtained (Belfour 1967, Wood 1971, Swanson 1975).

Library and information science research is a relatively recent phenomena - Layzell Ward, Burkett, and Whiteman (1975) suggest that the first institutional research in librarianship began in the 1930's - so methodological deficiencies

and inconsistencies in such research are inevitable, at present, and should be seen as part of the process towards the establishment of sound criteria and procedures for library and information science research.

With regard to use studies, general criticisms include concern about the inexperience of researchers and the resultant problems of obtaining an adequate and representative study sample, producing a useful questionnaire design, and obtaining an adequate response (Line 1970, Wood 1971, King and Byrant 1971).

The subjective nature of any results obtained also appears to be a hindrance to effective user evaluation. However, questions can be designed to reduce this subjectivity and providing the subjective nature of some answers is recognised these answers might even provide useful information for the researcher. However subjective a user's perception of a service may be, for instance, if it affects his use of that service then it should be noted by the researcher.

Other criticisms of use studies have involved the coverage and timeliness of the studies. Wood (1971) looked at 100 use studies and found that many were published accounts of studies of local situations which had little general interest and for which there was little justification in publishing at all.

Swanson (1975) also criticises the narrow frame of reference often adopted in use studies and suggests that "the underlying situational frame of customers" should always be taken into account in any study. For instance, in considering libraries which use an information service one study is quoted which obtained information on the libraries' acquisitions and processing policies and procedures as an aid to interpreting their use patterns (Swanson 1975). Swanson (1975) also argues for the continual evaluation of information services - something which is almost impossible for many small information services with small staff numbers - and considers that the value of use studies are undermined when they are "isolated endeavours".

Perhaps the most difficult problem affecting the success of user studies in information science is that they are competing with other use studies for the limited time of a respondent. Surveys originate from a wide variety of organisations and cover a wide subject area so there is always the nuisance factor affecting a survey's success.

Having outlined some general problems of use studies but accepting that they can be useful, the following section considers why such a study of the BIC is desirable at this stage.

2.3 BIC - Use Study

Chapter 1 (Section 1.3), in detailing the general

development of specialised information centres, described a number of use studies carried out of U.K. centres and this perhaps suggests that another use study of a specialised information centre is unnecessary. However, although specialist centres have similar organisations and activities no two centres are alike and as a result any user study of one centre will not invalidate a similar study of another centre, (this argument could be logically extended to justify studying a single centre's users one at a time although, in practice, this is unlikely to be feasible).

This particular study also seems to have a much broader frame of reference compared to earlier studies . All the U.K. studies, for instance, have been limited to investigating, in a very narrow way, the use of a particular service or bibliography offered by a centre. Very few, for example, have investigated the work environment or the information gathering environment of the user while only one study (Searle 1974) has contacted potential users of a service. Furthermore, no studies have related activity in a centre's subject area of interest to the use made of that particular centre by, for instance, relating the distribution of research output in the subject to the distribution of centre subscribers or by considering the possibility of alternative areas of subject expertise, perhaps competing with a centre, in areas where research activity is extensive.

With this in mind, therefore, this study includes an investigation of biodeterioration activity internationally

and also a study of potential centre users along with the study of the actual use patterns of the centre's services.

As far as B.I.C. is concerned two particular reasons suggest that a user study would be useful. Firstly, there is the problem associated with small organisations when small staff numbers mean that all resources are continually concentrated on maintaining a service and there is little possibility of diverting resources to evaluate a service. Centre operators have some measures of centre use: the amount of money paid for a service is some reflection of the perceived value of a service while mailing lists and enquiry and photocopy requests records can all be used to indirectly measure centre use.

Similarly, the frequency of second and subsequent uses is a good measure. However, all these measures have limitations and the analysis of records still requires human effort.

The fact that centre personnel are practitioners in their subject also means that as part of their activities they are likely to attend conferences and meetings when centre users will be present and when views on the centres activities can be expressed. However, this type of informal feedback, although useful, can again only be of limited value since a large majority of users will never be seen and opinions are likely to come, in general, from localised users in the U.K. who are willing and able to attend conferences.

The history of information science research at the B.I.C. also suggests that a use study would be appropriate at this stage of centre development. In 1967 a team from the Applied Psychology department at Aston University investigated the internal organisation of the centre and in 1969 an internal study of the "co-operating specialists" scheme was carried out (Willsher 1969) along with a descriptive study of the B.I.C. and other specialised centres in the U.K. (Robertson and Reynolds 1969). A recent study has also been carried out by Martyn (1974^a) into the effectiveness of using external computer services as input for the centre's services. All these studies have concentrated on the internal activities and operations of the B.I.C. so it certainly seems timely to carry out a user study to complement these earlier investigations and to obtain some indicators of centre use.

The problems of a centre use study would seem to revolve around any user annoyance factor associated with the study, the problem of obtaining only localised answers and the major difficulty of translating various user needs and preferences into any sort of workable policy for the future.

The B.I.C. operates a commercial service and as such is particularly dependent on the goodwill of subscribers and other users. It is hoped that subscribers will view any user study as an attempt to improve the centre's products and therefore see it as a useful exercise although there is always the slight danger of alienating the occasional subscriber by bothering him with a survey.

Accepting that the majority of users are willing to participate in the study there is also likely to be a bias inherent in the study which will result in more information being obtained from users geographically near to the centre. A sample of users overseas have been contacted by postal questionnaire while the majority of users in the U.K. and some users in continental Europe have been interviewed personally: almost inevitably the possibility to digress or expand a point in an interview situation results in more information being obtained in this manner than through a postal questionnaire. The postal questionnaire has also been sent to a number of countries where English is not the native language so that problems of interpretation and misunderstanding of questions which can be explained in an interview, may occur.

Assuming, however, that the questions are understood and that the response rate is high then there still appears to be a significant problem attached to use studies: the problem of incorporating the various user needs, preferences and recommendations into any future information service developments. A general argument for user studies is that they will produce feedback from the service's users and therefore let the service's operators know whether they are offering the right kind of services and, if not, suggest what changes are necessary to ensure continued financial support in the future. This theoretical process, however, can break down in practice for two reasons: firstly, in many service areas there will be conflicting needs and

preferences amongst users and only in certain instances will a user consensus exist regarding a particular feature of a service; secondly, the theoretical approach assumes that an organisation is flexible enough to react to any comments and suggestions for changes although, in practice, it seems that the recommendations of many studies are never implemented for one reason or another.

The former point suggests that even the most well designed study can only produce a limited number of meaningful results while regarding the latter point it is some comfort to know that analysis of industrial organisation suggest that small units, comparable to the B.I.C., are more flexible than large units since in the small institutions individuals carry out a number of functions and bureaucracy is less developed.(George 1971). The cynical, however, might argue the opposite: that information services like the B.I.C., because their relatively small resources are devoted in full to the continued maintenance of a given service level, are unable to devote any resources to implementing change and are thus totally inflexible!

The flexibility or otherwise of the B.I.C. in regard to this study will only be apparent after a period of time but in this context it is interesting to note the points, described earlier in this chapter, against the complete determination of the structure of information systems by service operators. User studies are often seen as the "opposite side of the coin" to studies carried out by organisers or

operators of information systems into input or processing methods. The development of user surveys suggests that the user is increasingly becoming part of an information service rather than outside of it and is able to influence the development of the service. However, how far a user can influence a service still depends ultimately on the service operator who remains the final decision maker: in short, a service tends to be at best a compromise between what is desired by users and what it is possible to provide.

There are obvious problems, therefore, with any use study and the previous remarks have attempted to relate these problems to the study of the BIC.

Given the general philosophy behind the study, the remainder of this section attempts to give an overview of the project and describes, in very general terms, the four major study areas of the project although detailed accounts of the methodology used are given in the appropriate chapters to follow.

Essentially, the study concentrates on an examination of the use patterns of the centre's four major information services: Biodeterioration Research Titles, International Biodeterioration Bulletin, the technical enquiry service, and the photocopy service. This examination has involved unobtrusive measurement by investigating centre records and monitoring, particularly, the use of the enquiry and photocopy services and has also directly involved centre users

and workers in the study of a sample of subscribers and enquirers.

A sample of subscribers provided information either by postal questionnaire or in an interview and with a sample of enquirers the enquiry answerers were asked to detail the procedures and actions taken in answering the enquiry while enquirers were also contacted regarding the nature of and background to the enquiry and the usefulness of the answer provided. All users of particular centre services contacted were also asked whether they had used other services of the centre and their reasons for use or non-use.

This central area of study was supplemented by an investigation of potential users who did not use the BIC. Theoretically, the study of potential users of an information service seems a good idea although the problem in practice appears to be that it is difficult to identify useful representative groups of potential users. In the study of the BIC a number of potential user groups, by their actions, suggested that they were definite potential users of the centre and would therefore represent useful groups to contact.

The three groups were authors who had papers cited in Biodeterioration Research Titles during 1975 and had asked for details of the centre's services; Biodeterioration Society members who were not subscribers to the centre's services; individuals who had sent a technical enquiry to the

centre but were not subscribers to the centre and had not become subscribers.

Members of these groups were contacted by postal questionnaire or telephone to discover their subject interest and background, their interest in the centre, and their reasons for not subscribing.

To support the two areas of study outlined above a small study of Biodeterioration activity internationally was carried out. The main purpose of this study is to relate activity within the subject to the use made of the BIC and the study has essentially involved an analysis of the references cited in the 1975 issues of Biodeterioration Research Titles along with a brief examination of the activities of organisations and societies involved in biodeterioration studies.

Questions covered include: How far are problems of biodeterioration studied internationally and how far is the distribution of study reflected in centre use? Are certain institutions or geographical areas dependent on or independent of the centre's services? What organisation types engage in the study of biodeterioration problems? What subjects within biodeterioration are particularly important? What is the extent of personal communication between workers involved in biodeterioration? and How far is the centre actively engaged in the study of biodeterioration problems?

Finally, the fourth area of study has attempted to place

the evaluation study of the centre in the context of the development of specialised information centres in general, and, in particular, development in the U.K. Although not directly connected with the other three areas of study it was felt that a general survey of U.K. centres would provide information on:

1. the range of services offered and subjects covered by centres
 2. the organisational characteristics of centres
 3. the extent of evaluation by centres
 4. how far the centres were carrying out the functions outlined in the definitions of specialised information centres contained in the introduction
- and 5. how far the Biodeterioration Information Centre was typical of specialised information centres in general.

With this information it should be possible to:

1. estimate how far the results of the user evaluation are generally applicable to other centres
 2. comment on the present state and offer some possibilities for the future development of specialised information centres
- and 3. offer some observations to aid present and future operators of specialised information centres.

With this in mind a dozen centres have been visited in the U.K.

2.4 Conclusion

If anything, the comments expressed in this chapter may well have underestimated the value of a use study and if this is the impression given then it probably originates from the view that many use studies, in the past, have been carried out in an optimistic atmosphere where their usefulness, in terms of user participation in the decision making of a service, has often been over-emphasised.

At a very basic level, a use survey brings users and producers of a service into contact and hopefully, offers some encouragement to producers by showing that their products are at least being used. Without a formalised study, for instance, producers of a bibliography, such as Biodeterioration Research Titles, can discover very little of the way the bibliography is used, if at all, by subscribers. Similarly, at this basic level, users probably in general, welcome the opportunity to express their views on a service. In this context, for instance, it was noticeable during the study that even where some users suggested, in reaction to the initial request for an interview, that they used the centre's services very little and therefore had little to say, the majority of these users were still willing to participate in an interview and discuss their use. In many instances also the eventual interview showed that users'

definitions of "little use" did not always correspond to the researcher's idea of "little use" but this is something that is considered in more detail in the following chapters.

At a more detailed level the outline of the research areas covered suggests a wide base for the study although inevitably areas of study and particular methodologies have been excluded. Certain user groups, for instance, have not been studied and lapsed users have largely been ignored. It is hoped, therefore, that on reading the results as a whole in the following chapters that they suggest that the priorities considered in selecting the study areas were the correct ones.

Finally, where considered appropriate, recommendations and suggestions for future research have been made and in this respect it is hoped that the research reported here will become another part of a continuous evaluation process of the B.I.C.

Chapter 3A Study of Biodeterioration Activity Internationally

3.1 Introduction

3.2 Research Output in Biodeterioration

3.2.1 Methodology

3.2.2 Biodeterioration Research Titles - Reference
Input Study 19753.2.3 International Biodeterioration Bulletin -
Article Study 1965 - 19753.2.4 The Biodeterioration Society and the Internat-
ional Biodegradation Research Group

3.3 Conclusions

3.1 Introduction

Two of the general hypotheses of this thesis outlined in the introduction are that:

1. biodeterioration as a subject of study is concentrated in a few areas and
2. the B.I.C. has reached its maximum obtainable user numbers.

To examine how far these hypotheses correspond to reality it is important to investigate the distribution and nature of biodeterioration activity internationally. In this chapter the distribution of biodeterioration activity is considered generally and in Chapter 8 this distribution is compared to centre use and non-use patterns.

Measures of biodeterioration activity have been carried out by an analysis of the document input to the B.I.C., an examination of the articles submitted to the International Biodeterioration Bulletin and a brief observation of the membership of certain scientific societies and organisations involved with biodeterioration.

Section 2 and 3 of this chapter consider the total world activity in biodeterioration.

Earlier indices of biodeterioration have been the O.E.C.D. Directory of Biodeterioration Research (1968) and the B.I.C.'s "Institute Index" compiled between 1966 and 1970 (BIC 1969, Eggins and Willsher 1970). The O.E.C.D. publication contained information on 157 institutions in 27 countries involved in biodeterioration research. By 1970

the B.I.C.'s "Institute Index" listed 1,000 institutes from forty two countries.

A few descriptions of biodeterioration research in individual countries have also appeared in the International Biodeterioration Bulletin from time to time (Garnier 1965; Kimor 1966; Zyska 1966; Traxler & Yeager 1967; Savulescu 1968; Parbery 1974). Countries covered include the U.S.A., France, Poland, Rumania, Israel and Australia.



3.2 Research Output in Biodeterioration

3.2.1 Methodology

One method of obtaining information on the activity within a subject is by analysing the scientific bibliographies in that subject (Bottle 1973). Therefore to measure research output in biodeterioration, all references contained in the 1975 issues of Biodeterioration Research Titles have been examined and analysed: information was obtained on the author numbers, country of origin, subject for each reference, and the type of institution housing the author.

The B.I.C. also produces a scientific primary journal - the International Biodeterioration Bulletin - and the geographical source, subject and authorship of articles included in this journal since 1965 have also been investigated.

Finally the 1975 membership records of the Biodeterioration Society and the International Biodegradation Research Group provided further information on the geographical distribution of activity in the subject.

3.2.2 Biodeterioration Research Titles - Reference Input Study 1975 - General Distribution

In 1975 the four issues of Biodeterioration Research Titles contained just over 1700 references and the geographical distribution, author and institution details for these references are set out in Figures 2 and 3. Figure 4 gives the percentage of references originating from the fifty eight countries and international organisations

Figure 2Geographical Distribution of References cited in Biodeterioration Research Titles(1975)

<u>Country</u>	<u>Reference Total</u>	<u>Country</u>	<u>Reference Total</u>
1. U.S.A.	483	Bangladesh	3
2. U.K.	244	Rhodesia	3
3. India	131	Malaysia	3
4. Japan	79	31 } China	3
5. W.Germany	68	Brazil	3
6. U.S.S.R.	51	Philippines	3
7. Canada	44	Thailand	3
8. Israel	43	Kenya	2
9. Australia	37	Ghana	2
10. Egypt	33	Spain	2
11. Sweden	28	32 } Indonesia	2
12. Rumania	26	Bulgaria	2
13. { France	24	Yugoslavia	2
Poland	24	Iraq	2
15. Nigeria	17	New Guinea	2
16. { N.Zealand	16	Sri Lanka	1
Italy	16	Tanzania	1
18. Denmark	15	Portugal	1
19. Netherlands	13	Zambia	1
20. Czechoslovakia	9	Sierra Leone	1
21. { Norway	8	Kashmir	1
Finland	8	45 } Senegal	1
23. Austria	7	Sudan	1
24. { Switzerland	6	Singapore	1
E.Germany	6	Turkey	1
26. S.Africa	5	Argentina	1
27. { Belgium	5	Puerto Rico	1
Pakistan	4	Paraguay	1
Hungary	4		
Eire	4		
		TOTAL	1506
			+
		International, Intergovernmental organisations =	104
			1610

N.B. in 95 instances the origin of publication could not be identified.

Figure 3

Author, Institution numbers for references cited in Biodeterioration Research Titles (1975)

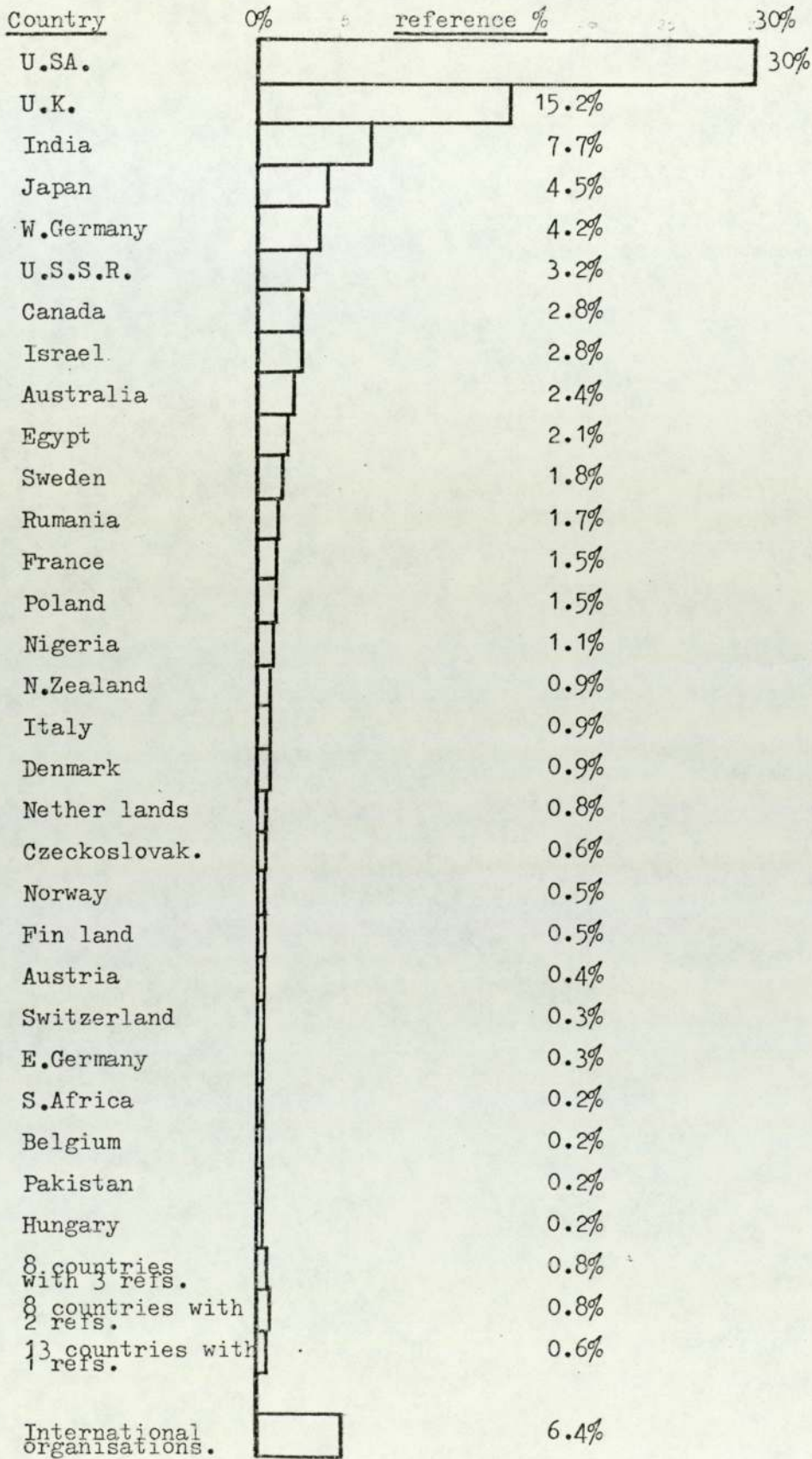
Country	Author No's	First Author No's	Inst. No's	Country	Author No's	First Author No's	Inst. No's
1. U.S.A.	697	304	163	Bangladesh	4	3	2
2. U.K.	207	126	77	Rhodesia	3	3	2
3. India	188	101	69	Malaysia	4	2	2
4. Japan	137	50	29	31 China	4	2	2
5. W.Germany	83	48	35	Brazil	3	3	3
6. U.S.S.R.	91	36	10?	Philippines	5	3	3
7. Canada	55	31	24	Thailand	3	2	2
8. Israel	40	19	7	Kenya	2	2	2
9. Australia	38	29	21	Ghana	2	2	2
10. Egypt	33	17	4?	Spain	2	1	1
11. Sweden	19	13	12	38 Indonesia	3	2	2
12. Rumania	39	19	5?	Bulgaria	1	1	1
France	47	20	14	Yugoslavia	2	1	1
13. Poland	35	20	11	Iraq	5	2	2
15. Nigeria	15	13	8	New Guinea	3	1	1
N.Zealand	24	15	7	Sri Lanka	1	1	1
16. Italy	32	15	9	Tanzania	2	1	1
18. Denmark	25	10	9	Portugal	1	1	1
19. Netherlands	14	8	8	Zambia	3	1	1
20. Czechoslov.	13	7	9	Sierra Leone	2	1	1
Norway	8	6	6	Kashmir	3	1	1
21. Finland	6	4	2	45 Senegal	1	1	1
23. Austria	4	3	3	Sudan	1	1	1
Switzerland	7	6	5	Singapore	2	1	1
24. E.Germany	7	5	3	Turkey	1	1	1
26. S.Africa	8	4	4	Argentina	2	1	1
Belgium	3	3	3	Puerto Rico	2	1	1
Pakistan	8	4	3	Paraguay	1	1	1
27. Hungary	7	4	4				
Eire	9	3	3				
				<hr/> TOTALS 1858 968 608			

N.B. in 95 instances the origin of publication could not be identified.

?total numbers unknown

Figure 4

% of references originating in countries/international organisations



In Figure 2, the number of references originating from each country is given along with the references from international organisations. The figures represent the country of origin of the first author of the reference and not the country where the reference was published, although in the majority of instances these two geographical sources are the same. References included cover periodical articles, notes, reviews, monographs, theses, research reports, papers presented at conferences standards and patents. The patents have been allocated to the country where the institutions that produced the patents exist and not to the country where the patents were published: for instance 131 patents published in the U.K. were included in Biodeterioration Research Titles in 1975 but only seventy of these were produced by British institutions with the remainder originating from the U.S.A., U.S.S.R., West Germany, Japan and Holland.

Figure 3 provides details of the author numbers and institution numbers relating to the reference numbers in Figure 2, although in certain instances the exact number of institutions is unknown.

Reference Distribution by Country

Fifty eight countries have contributed references to Biodeterioration Research Titles in 1975, along with nineteen international or intergovernmental bodies. Distribution is, generally, widely dispersed but when percentages originating from each country are considered some concentrations of reference supply can be identified. The top three reference producing countries, for instance, produce over 50% of the total references. The top ten countries account for 73.5% .

International and intergovernmental bodies have also contributed 6.4% of the references and this means that 23 countries plus various international organisations have produced 90% of the reference total. (Details given in Figure 4).

Two general points can be made, however. The position of Egypt as the 10th major producer of references in 1975 is untypical of other years. From 1970 to 1974 only twenty four references were cited from Egypt while the thirty three Egyptian references cited in 1975 included twenty two references from a large conference held in Egypt for the first time. Similarly the reference input from France in 1975 is less than in previous years; statistics for the previous five years show that the average yearly input from France is forty nine references while before 1975 the minimum yearly input was thirty nine references.

Finally, the grouping of references sources with similar economic and political backgrounds shows that the developing countries are producing more references than Western Europe (excluding the U.K.)

	<u>% of References</u>
1. Developing Countries	13%
2. Eastern European Bloc	7%
3. Western Europe (excluding the U.K.)	12.5%

Distribution by subject and country

The number of references in each of the 125 subject sections of Biodeterioration Research Titles is shown in Figure 5). and forty sections covered 84% of the references.

Figure 5Biodeterioration Research TitlesReference Numbers per Section 1975

AA	Biodeterioration - General	..	..	..	..	6
AE	Legislation and standardisation	..	..	..	..	1
AG	Education and training	..	..	..	..	*
AM	Preservation - physical	..	..	..	..	2
AN	Preservation - chemical	..	..	..	..	21
BA	Foodstuffs - general	..	..	..	..	5
BC	Spoilage and infestation	..	..	..	..	28
BF	Storage	..	..	..	..	7
BH	Techniques	..	..	..	..	15
BK	Preservation	..	..	..	..	7
BM	Physical	..	..	..	..	26
BN	Chemical	..	..	..	..	21
BQ	Toxins	..	..	..	..	2
BS	Bacterial	..	..	..	..	27
BT	Fungal	..	..	..	..	92
BW	Animal Feeds	..	..	..	..	16
CA	Carbohydrates	..	..	..	..	*
CC	Grain	..	..	..	..	54
CD	Barley, oats, rye	..	..	..	..	6
CE	Maize	..	..	..	..	15
CF	Rice	..	..	..	..	12
CG	Sorghum, millet	..	..	..	..	2
CH	Wheat, buckwheat	..	..	..	..	15
CI	Pulses	..	..	..	..	5
CJ	Flour	..	..	..	..	5
CK	Bakery Products	..	..	..	..	3
CM	Sugar	..	..	..	..	1
CN	Confectionery	..	..	..	..	*
CP	Oilseeds, nuts, vegetable oils	..	..	..	..	18
CR	Coffee and cocoa	..	..	..	..	*
CT	Tobacco	..	..	..	..	8
CV	Spices	..	..	..	..	7
CW	Sauces, dressings, soups	..	..	..	..	2
CX	Beverages	..	..	..	..	17
CY	Fruit and vegetable juices	..	..	..	..	4
DA	Fruit and vegetables	..	..	..	..	23
DB	Pome fruit	..	..	..	..	22
DC	Stone (drupaceous) fruit	..	..	..	..	5
DD	Citrus fruit	..	..	..	..	13
DF	Tropical and subtropical small fruit	..	..	..	..	1
DG	Tropical and subtropical tree fruit	..	..	..	..	3
DH	Soft fruit-berries	..	..	..	..	7
DI	Soft fruit-others	..	..	..	..	2
DJ	Grapes	..	..	..	..	1
DL	Melon, pumpkin, etc	..	..	..	..	*
DM	Tomato, etc	..	..	..	..	6
DO	Dried Fruit	..	..	..	..	*
DP	Root vegetables	..	..	..	..	6
DR	Tuber and corm vegetables	..	..	..	..	2
DS	Potato	..	..	..	..	4
DT	Bulb vegetables	..	..	..	..	3
DV	Green vegetables	..	..	..	..	1

cont...

Figure 5 cont.

DW	Salad vegetables	..	..	..	..	..	..	5
DX	Legumes	..	..	..	..	..	..	1
DZ	Mushrooms	..	..	..	..	..	..	*
EC	Fish and seafood..	..	..	..	..	..	..	30
EF	Meat..	..	..	..	..	..	..	30
EJ	Poultry	..	..	..	..	..	..	11
EL	Eggs..	..	..	..	..	..	..	*
EN	Dairy Products	..	..	..	..	..	..	2
EP	Milk	..	..	..	..	..	..	17
EQ	Butter..	..	..	..	..	..	..	*
ER	Cheese..	..	..	..	..	..	..	5
ET	Animal Protein	..	..	..	..	..	..	1
EV	Leather	..	..	..	..	..	..	4
EX	Animal Fibres	..	..	..	..	..	..	7
EY	Adhesives	..	..	..	..	..	..	2
FB	Lignin	..	..	..	..	..	..	4
FE	Cellulose	..	..	..	..	..	..	6
FG	Vegetables fibres.	..	..	..	..	..	..	*
FJ	Timber	..	..	..	..	..	..	32
FL	Bacterial attack	..	..	..	..	..	..	3
FM	Terrestrial fungal attack..	..	..	..	..	..	..	40
FN	Marine/aquatic fungal attack	..	..	..	..	..	..	3
FO	Insect attack	..	..	..	..	..	..	15
FP	Marine borer attack.	..	..	..	..	..	..	6
FR	Preservation	..	..	..	..	..	..	125
FT	Wood pulp	..	..	..	..	..	..	8
FU	Paper	..	..	..	..	..	..	8
FV	Books, etc	..	..	..	..	..	..	1
FX	Textiles	..	..	..	..	..	..	14
GB	Hydrocarbons..	..	..	..	..	..	..	1
GD	Fuels	..	..	..	..	..	..	*
GE	Cutting oils and lubricants..	..	..	..	..	..	..	1
GH	Plastic polymers..	..	..	..	..	..	..	11
GJ	Rubbers	..	..	..	..	..	..	5
GK	Plastics	..	..	..	..	..	..	10
GM	Bitumen	..	..	..	..	..	..	3
GP	Pharmaceuticals and cosmetics	..	..	..	..	..	..	3
GS	Paint	..	..	..	..	..	..	31
GU	Metals	..	..	..	..	..	..	13
GW	Stone and concrete	..	..	..	..	..	..	3
GY	Glass	..	..	..	..	..	..	*
HA	Constructions	..	..	..	..	..	..	*
HC	Packaging	..	..	..	..	..	..	9
HE	Instruments and equipment..	..	..	..	..	..	..	4
HG	Works of art and museum specimens..	..	..	..	..	..	..	8
HI	Structures and vehicles	..	..	..	..	..	..	11
HJ	Internal infestations	..	..	..	..	..	..	6
HL	Surface infestations(fouling) terrestrial	..	..	..	..	..	..	4
HM	Surface infestations(fouling) marine and freshwater..	..	..	..	..	..	..	58
HO	External infestations	..	..	..	..	..	..	3
HQ	Transport systems	..	..	..	..	..	..	*
HR	Roads and railways	..	..	..	..	..	..	*
HS	Waterways	..	..	..	..	..	..	75
HU	Pipelines	..	..	..	..	..	..	1
HV	Cooling and water supply systems	..	..	..	..	..	..	13
HX	Cables and transmission lines	..	..	..	..	..	..	1

cont.

~~Table 5~~ cont.

14	Organisms	*
15	Microorganisms	7
16	bacteria.. .. .	18
17	Actinomycetes	2
18	Fungi	38
19	Algae and lichens	11
20	Higher plants	24
21	Animals	*
22	Invertebrates	5
23	Insects-general	83
24	Insects-control	156
25	Mites	7
26	Vertebrates	4
27	Birds	8
28	Rodents	84
29	General techniques	12
30	General control	46

Total: 1,705

* No references included in these sections

To some extent the apparent concentration of references in a few subject sections is a reflection of the design of the classification scheme in that some subject areas are classified in more detail than others. For instance, the subject area "Insects" covers only two sections - IN and IO - while the subject area "Fruit and Vegetables" covers twenty sections - DA to DZ - classified by specific fruits and vegetables. If the "Insects" sections were divided in some way either by type of insect or geographical location of insect the large number of references at present in Section IO would be spread over a number of sections.

However, even considering the design of the classification scheme, there are still a number of subject areas, either covered by one section or a number of sections, which contain a large percentage of the total references. These subject areas are "Fungal toxins" - BT - ninety two references (5%); "Grain" - CC to CI - 109 references (6%); "Timber" - FJ to FT - 224 references (13%) particularly "Timber Preservation" - FR - 125 references (7%); "Insects" - IN, IO - 239 references (14%) and "Waterways" - HS - 75 references (4%), (See Figure 6).

Accepting that there are certain subject concentrations within biodeterioration it is interesting to see how far individual countries cover the whole field of biodeterioration and whether there are any subjects which are confined to only one or two countries. In general, there is a rough correlation between the number of references produced and the number of sections covered with the only exception being Sweden whose references are concentrated in the "Timber" sections.

The subject sections with the largest number of references according to Table 6 are also those with the greatest number of reference producing countries. The subject area which presents the greatest diversification of output in terms of reference producing countries is "Timber Preservation": twenty countries have contributed references.

Other subject areas where reference output is widely scattered are "Insects Control" - IO - with nineteen reference producing countries, "Insects General" - IN - with seventeen reference producing countries, and "Grain" - CC - with seventeen reference producing countries.

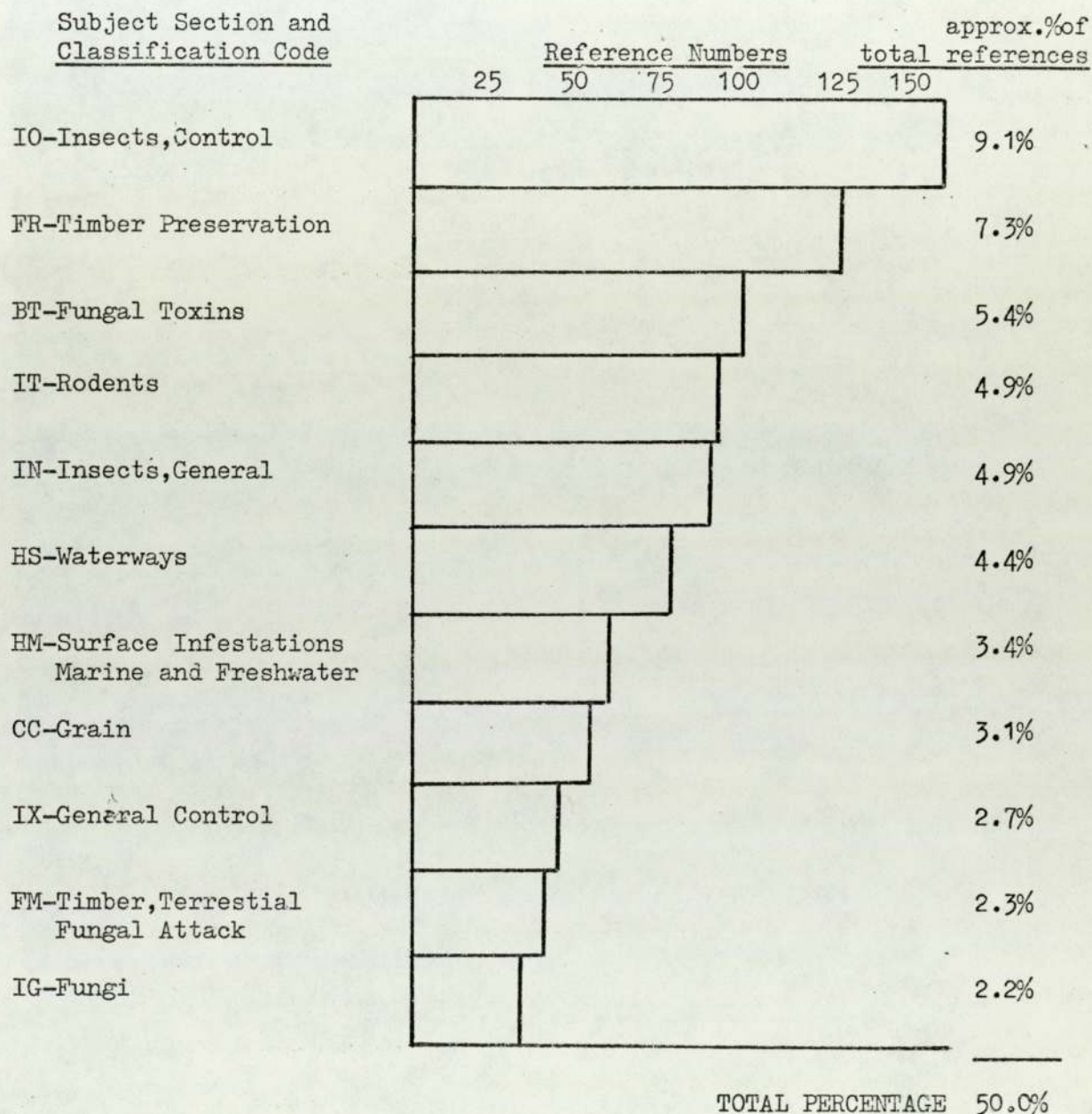
However, although "Insects Control" has nineteen reference producing countries, over 50% of the references have originated in the United States.

Further subject areas with a number of reference producing countries are "Fungal toxins" - BTC - with fourteen countries although 70% of the references are from the United States, "Meat" - EC - with fourteen countries all contributing between one and seven references, "Marine fouling" - HN - covering thirteen countries, although again a large percentage of the references are concentrated in the United States and the United Kingdom and "Preservation - Physical" - AM - spread over thirteen countries.

From an analysis of the references in 1975 it appears that no subject is exclusively studied in one country although certain concentrations of research do seem to exist as described in the last paragraph.

Figure 6

Top eleven reference containing subject sections in B.R.T. (1975)



Full classification scheme and reference numbers for 1975 given in Figure 5.

Similarly very few of the major reference producing countries seem to have their references concentrated in one subject area. The exception is Sweden which although it has references in eleven sections, five of these sections are in the "Timber" subject area and these five sections cover 75% of Sweden's reference output for 1975.

Author Numbers

The number of personal authors producing the references in 1975 was 1858 and the total number of first authors was 988. If international organisations and corporate institutions are then added, as authors, the former total becomes 1939 and the latter 1069.

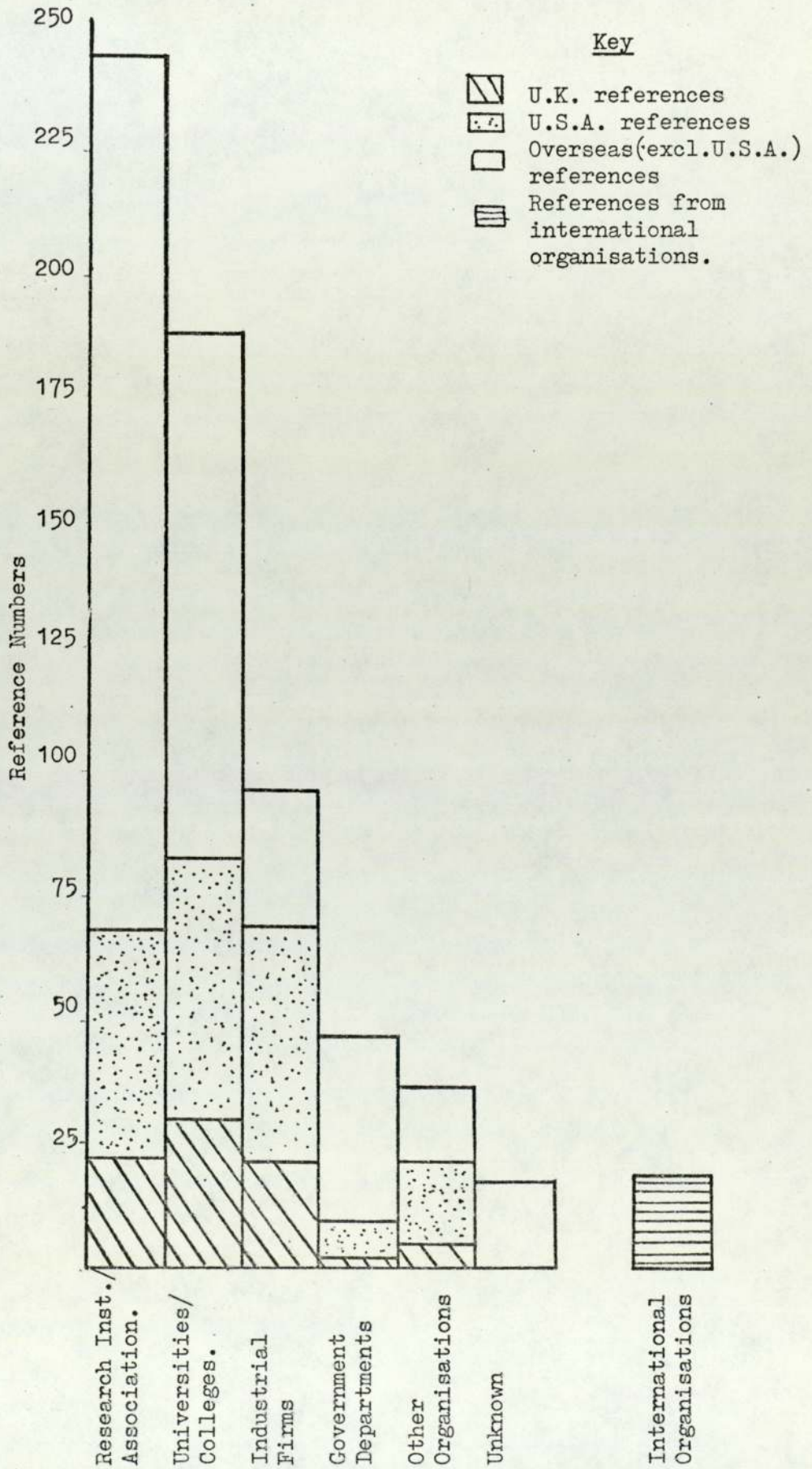
Price has suggested (1969) that if one year's first author numbers are multiplied by two then this will give an estimate of the total numbers of authors active in that particular subject. Given first author numbers as 988 in 1975 this would produce total author numbers of 1976.

Distribution by Institution

A total of 627 institutions have housed the authors of references in 1975. The institution types are given in Figure 7.

The largest producers of research output are the various research institutions which include government, industrial and private research organisations. In the United States, Canada

Figure 7

Institutional source of references in B.R.T. 1975

and Australia these research institutions are predominantly government organisations. In the United States, for instance, forty one of the forty five research institutions are government supported and include the network of research stations in the Agriculture (USDA) and the Defence research establishments.

In Canada ten of the fourteen research organisations are government supported and in Australia eleven out of twelve are similarly supported with four establishments being part of the Commonwealth Scientific and Industrial Research Organisation (CSIRO).

The column headed "Government" in Figure 7 , therefore, includes government ministries and departments concerned predominantly with administration and not research.

Generally, industrial firms as producers of research output are concentrated in the United States and the United Kingdom, with elsewhere research institutions and institutes of higher education being responsible for the majority of research output.

Finally, a number of institutions within each major institution type have been concerned with the production of a significant proportion of the total number of references in 1975. These institutions are detailed in Figure 8.

Summary

An examination of a sample of earlier issues of Biodeterioration Research Titles from 1971 to 1974, suggests that, apart from Egypt and France, each country's percentage of total references has fluctuated only slightly around the percentages given

Figure 8Institutions producing 5 or more references in 1975

	<u>Country</u>	<u>Reference Total</u>
<u>(a) Firms</u>		
Abbotts Laboratories Inc.	U.S.A.	8
Rentokil Ltd	U.K.	7
Proctor and Gamble	U.S.A.	5
Nippon Shinyaku Co Ltd	Japan	5
<u>(b) Government Depts.</u>		
Food and Drug Administration	U.S.A.	24
<u>(c) Institutes of Higher Education</u>		
California Univ.	U.S.A.	24
Wisconsin Univ.	U.S.A.	12
Cairo Univ.	Egypt	8
Imperial College	U.K.	7
Virginia St. Polytechnic	U.S.A.	7
Ibadan Univ.	Nigeria	6
Maryland Univ.	U.S.A.	5
Purdue Univ.	U.S.A.	5
Georgia Univ.	U.S.A.	5
Tokyo Medical and Dental Univ.	Japan	5
<u>(d) Research Institutions/Assocs.</u>		
Pest Infestation Control Lab.	U.K.	17
Inst. Tech. Storage Agric.	Israel	16
Stored Products Lab (ARS/USDA)	U.S.A.	15
Savannah Res. Stn. (ARS/USDA)	U.S.A.	15
Agric. Res. Council	U.K.	12
Grain Storage Instit.	India	11
Natu Inst. Hyg. Sci.	Japan	10
Bundestalt fur Material prufing	W.Germany	10
Volcani Int	Israel	10
Indian Agric. Res. Inst.	India	8
Beltsville Res. Stn.(ARS/USDA)	U.S.A.	8
Madison Res. Stn.(ARS/USDA)	U.S.A.	8
Building Res. Establishment	U.K.	7
Div. Building Res. (CSIRO)	Australia	7
U.S. Army Natick Labs	U.S.A.	6
Max Plank Inst.	W.Germany	5
Peoria Res. Stn. (ARS/USDA)	U.S.A.	5
Gainesville Res.Stn.(ARS/USDA)	U.S.A.	5

For 1975, therefore, the ⁸⁴geographical concentrations and subject concentrations of 1975 references are also likely to be evident in the total references of the B.I.C. from 1971 to 1975.

3.2.3 International Biodeterioration Bulletin - Article Study 1965 - 1975

In considering biodeterioration activity internationally it is perhaps useful to examine the articles contained in the International Biodeterioration Bulletin, a quarterly scientific journal produced by the B.I.C. containing original articles on all aspects of biodeterioration.

Of course, the study of this journal's input is unlikely to give a genuine picture of biodeterioration research for a number of reasons. Firstly, unlike the bibliography examined earlier, the journal does not attempt to be comprehensive and although articles from all countries are welcomed there is no active attempt to collect articles for inclusion. Rather, like most scientific journals, the editors invite contributions which are then refereed and then may later be included in the journal.

Secondly, articles on biodeterioration problems appear in a wide variety and number of journals. Over 1,000 journals provided references to the B.I.C. in 1971 for instance (Garrett and Willsher 1971). The selection of one journal, albeit the only one which concentrates exclusively on biodeterioration, to measure biodeterioration activity is therefore rather simplifying the position.

Also, the journal is produced in the United Kingdom and therefore knowledge of the journal and of the opportunities to publish in it is likely to be greater in the

United Kingdom than elsewhere. There is an international Editorial Board to the journal but of the sixteen members of this Board, eight are from the United Kingdom and the remaining members are either from Continental Europe or the United States.

Nevertheless, it is important to examine the article input to this journal as it is mailed to approximately 600 addresses throughout the world and therefore represents an important source of information on biodeterioration and an important outlet for biodeterioration publications.

An examination of the International Biodeterioration Bulletin and a comparison with the bibliography studied earlier in this chapter may also serve to indicate how far the Bulletin does in fact reflect biodeterioration activity internationally and how far the Bulletin is influenced by its environment of publication.

Article and Author Distribution

From 1965 up to 1975, 196 articles have been included in the Bulletin. These articles have originated in a total of twenty seven countries with the United Kingdom providing by far the greatest number - seventy eight articles. Figure 9 gives the number of articles originating in the twenty seven countries. The United States, the Netherlands, Poland, France and Australia follow the United Kingdom as major sources of articles. The only country not represented here but included in the 'Top Twenty' countries for references cited in Biodeterioration Research Titles is Japan,

Figure 9

Geographical Source of articles included in International
Biodeterioration Bulletin 1965-1975.

<u>Country</u>	<u>Article Numbers</u>	
U.K.	78	
U.S.A.	26	
Netherlands	19	
Poland	9	
France	9	
*Inter-national articles	8	*articles involving co-operation between authors in separate countries.
Australia	8	
W. Germany	5	
Czeckoslovakia	5	
Canada	4	
Switzerland	3	
U.S.S.R.	3	
N. Zealand	2	
Denmark	2	ARTICLE TOTAL = 196
Israel	2	
Italy	1	
S.Africa	1	
Uganda	1	
Sweden	1	
Nigeria	1	
Tanzania	1	
Spain	1	
Norway	1	
India	1	
Brazil	1	
Ceylon	1	
Rumania	1	
Malaysia	1	

while India has contributed only one article despite its high position as a reference producer in Biodeterioration Research Titles.

211 authors are represented in the article number of 196 although, when only first authors are considered, the author number is reduced to 110. This figure of 110 seems rather small when compared to the number of first authors contributing references to Biodeterioration Research Titles in 1975 alone, 1069.

Of the 110 first authors the top seven authors, in terms of article output, have produced fifty three articles or 27% of the total. Of these seven authors, three are found in the United Kingdom, two in the Netherlands, one in Australia and one in Poland.

Subject Coverage

The 196 articles appearing in the International Biodeterioration Bulletin have been classified using the classification scheme from Biodeterioration Research Titles. The results are shown in Figure 10 . This shows that certain subject areas have been well covered by the Bulletin, notably timber, rubber and plastics, biodeterioration general and general techniques.

A significant number of new techniques in a scientific journal is to be expected while the large number of articles in the "Biodeterioration General" section include research

Figure 10

Subject classification of articles contributed to I.B.B.(1965-1975)

Subject Area	Article No's	Subject Area	Article No's
General		Pharmaceuticals and	
Biodeterioration	19	Cosmetics	2
Legislation	1	Paint	1
Foodstuffs-General	1	Metals	2
Foodstuffs-Spoilage		Glass	1
and Infestation	4	Constructions-Packaging	1
-Techniques	3	-Instruments	7
-Preservation	1	and Equipment	7
Toxins-Fungal	3	-Works of Art	1
Carbohydrates	1	-Surface	
Grain-Sorghum, Millet	2	Infestations, Marine and	
-Pulses	1	freshwater	3
Oilseeds, nuts, vegetable		-External	
oils	4	Infestations	1
Coffee and Cocoa	1	Transport Systems-Waterways	3
Fruit and Vegetable		-Cooling	
Juices	1	and water supply systems	1
Fruit and Vegetables-		-Cables	
Tuber and Corm.	2	and transmission lines	1
Lignin	2	Organisms-Microorganisms	3
Cellulose	6	-Bacteria	2
Timber -General	14	-Actinomycetes	2
Timber-Terrestrial		-Fungi	13
Fungal Attack	3	-Algae and Lichens	1
-Insect Attack	4	-Higher Plants	1
-Marine Borer		-Insects, General	3
Attack	7	-Insects, Control	6
Paper	1	-Birds	2
Textiles	7	-Rodents	1
Hydrocarbons-Fuels	5	General Techniques	16
-Cutting Oils		General Control	3
and Lubricants	4	Waste Materials	
Plastic Polymers	3	Biodegradation	3
Plastic Polymers-Rubber	6		
-Plastics	9		
-Bitumen	1		
		TOTAL ARTICLE	196
		NUMBERS	

*Subject Classification based on Biodeterioration Research
Title's classification (for full classification see Fig. 5)

reviews and articles on the economics of biodeterioration. The timber section, as in Biodeterioration Research Titles, is well covered but the other large sections identified earlier in Biodeterioration Research Titles have little coverage in the Bulletin. Rubber and plastics deterioration, conversely, has significant coverage in the Bulletin but is a relatively small section in Biodeterioration Research Titles.

3.2.4 The Biodeterioration Society and the International Biodegradation Research Group

The Biodeterioration Society and the International Biodegradation Research Group (IBRG) are two organisations exclusively involved with biodeterioration and a brief note of their activities and membership is given here to provide some indication of meeting and conference activity in biodeterioration. There are other scientific and professional bodies which have some interest in biodeterioration - the last three annual reports of the B.I.C. for instance (B.I.C. 1973, 1974, 1975) have noted conferences relevant to biodeterioration organised by eleven organisations - but the two bodies considered here are the only ones exclusively concerned with the subject.

The Biodeterioration Society was established in 1969 with the announcement that "although this society is being initiated in the United Kingdom it is stressed that it is not regarded as a solely British venture and it is hoped that it will become truly international" (Anon 1969). The

International Biodeterioration Bulletin has become the official organ of the society while members can obtain the BIC's journals at reduced rates. "Regional Meetings Secretaries" exist in several countries outside Europe and the society organises an international symposium every three or four years.

In Autumn 1975 there were 241 members of the society from twenty eight countries confirming the society's international coverage, although 142 members were located in the United Kingdom with the second largest member group located in the United States comprising twenty six members. No other country's membership figures come into double figures and the twenty eight countries include thirteen European countries and eight developing countries while of the twenty top reference producing countries described in Table 4, Israel, Poland, USSR and Czechoslovakia have no members.

Although society membership covers twenty eight countries, active membership participation is concentrated in the United Kingdom where four or five meetings are held annually. The Regional Meetings secretaries who are located in Canada, United States, India and Japan have been relatively inactive as no regional meetings in these countries have as yet taken place (Allsopp 1975). Membership figures suggest that only the United States has sufficient members to warrant a meeting although the geographical dispersion of members would be a major obstacle.

Membership of the I.B.R.G. is concentrated in Western Europe and the United States. This group conducts

co-operative research in certain subject areas relevant to biodeterioration and at the end of 1975 there were fifty three participants representing thirty eight institutions. Meetings are held in the United Kingdom and continental Europe and the group represents a particularly active area of biodeterioration research with thirty eight participants regularly involved in laboratory work and meetings.

3.3 Conclusions

The study of Biodeterioration Research Titles in 1975 shows a definite concentration in terms of reference producing countries. The top three countries produce approximately half of the reference total and over three quarters of the references are produced by the top ten countries.

Fifty eight countries contributed references and an interesting point is that the developing countries are a major source of references: the developing countries produced more references than Western European countries, excluding the United Kingdom.

There also exists a definite concentration of references if subject area is considered: just under 9% (eleven sections) of the 125 sections in Biodeterioration Research Titles contain approximately 50% of the reference total. The "Insects" and "Timber" sections account for approximately 24% of the total.

No subject, however, appears to be exclusively studied in any one country although, with a number of subject areas, the United States has been responsible for over half of the reference total.

Reference producing authors are also concentrated in those institutions concerned solely with research rather than in the higher education sector or industrial firms.

Remembering that the International Biodeterioration Bulletin is published in the United Kingdom but that it

accepts papers from any country, it is interesting to note that 39% of all papers have originated in this country. Over a quarter of the papers have also been contributed by only seven authors in four countries. These authors, therefore, represent a significant contributing group to the journal although one author has not contributed since 1969. Again, timber deterioration and preservation is predominant as a major subject group.

Exclusivity in the research environment is illustrated further by the brief examination of the Biodeterioration Society and I.B.R.G.

As a result of these general observations it would appear that certain concentrations, particularly geographical, of biodeterioration activity do exist. This suggests that a similar concentration of B.I.C. subscribers should also exist to some extent. However, the actual correlation between activity and subscribers may be much less than expected since in the areas of high activity individuals may not need to use a biodeterioration information service as they can obtain information from other individuals and possibly from other information services.

While in areas of low activity the need for an information service in biodeterioration may be very great indeed especially if biodeterioration problems are being experienced by non-biologists; how far the B.I.C. is able to reach these non-specialists is another area for consideration. If individuals in the research community, for instance, are essentially the main advertising source for the B.I.C., then

non-specialists in low activity areas are not likely to obtain information on the B.I.C. easily since the research community for biodeterioration corresponds to the areas of high activity outlined above.

This relationship between biodeterioration activity and centre use is referred to in the following chapters dealing with B.I.C. use patterns and a general overview is given in Chapter 8.

The Establishment and Growth of the Biodeterioration Information Centre (B.I.C.)

- 4.1 Introduction
- 4.2 The establishment and early development of the B.I.C.
- 4.3 Initial growth of the B.I.C. (1965-1968)
 - 4.3.1 Services
 - 4.3.2 Document collection and processing
 - 4.3.3 Comments on the first three years
- 4.4 The second growth period of the B.I.C. (1968-1971)
 - 4.4.1 Introduction
 - 4.4.2 Services
 - 4.4.3 Document collection and processing
 - 4.4.4 The Consultative Council
- 4.5 The third growth period of the B.I.C. (1971-1975)
 - 4.5.1 Introduction
 - 4.5.2 Services
 - 4.5.3 Document collection and processing
- 4.6 Service and personnel levels at the B.I.C. in 1975
- 4.7 Conclusions

4.1 Introduction

As in most developing inter-disciplinary subjects workers in biodeterioration have to select relevant literature from many subject fields and from a wide variety of publications. As a result, the Biodeterioration Information Centre, was established in 1965 to collect, evaluate, store, and disseminate biodeterioration information as its primary function. However, in the newly developing subject areas where specialised information centres are largely found, such a centre also acts as a catalyst in the overall development of a subject, (Eggins, 1969), particularly if a centre has a close affinity with the scientific community it is there to serve. A central hypothesis of this thesis is that the Biodeterioration Information Centre has strong links with the biodeterioration community and has benefited, in its development, from these links. This chapter considers the hypothesis with particular emphasis on the establishment and early development of the B.I.C.

Consideration of the Centre's development begins in 1965 with its establishment and continues to a description of its present service levels which began in 1971. The description of Centre development attempts to investigate:

1. The resources called upon to establish the Centre.
2. The major changes in the development of the Centre and the consequences of these changes.
3. The studies carried out to evaluate the Centre.
4. The present variety of Centre services and their use.
5. The interrelationship of Centre development and the

expansion of biodeterioration as an identifiable subject study.

6. The position of the Centre in the spectrum of definitions of specialised information centres outlined in Chapter I.

The information for this study has come largely from records kept at the Biodeterioration Information Centre, published material on the Centre's activities and organisation, and some personal communication. As the study is concerned essentially with the use patterns of the Centre's services details of collection, processing and storage of materials and other areas of internal organisation of the Centre are given only where they are considered relevant. Earlier studies have dealt with the Centre's organisation and methods in detail (University of Aston 1968; Eggins, 1969; Willsher and Eggins, 1969; Robertson and Reynolds, 1969; Eggins and Willsher, 1970; Eggins, 1971; Garrett and Willsher, 1971; Martyn, 1974^a).

4.2 The Establishment and Early Development of the B.I.C.

In 1963, the Organisation for Economic Cooperation and Development (O.E.C.D.) set up an Expert Research Group on Biodeterioration of Materials. Since 1945 the United States National Academy of Sciences - National Research Council had maintained a Prevention of Deterioration Centre, the primary functions of which were to serve in a consulting and advisory capacity on deterioration prevention and to collect information from various sources on problems relating to the prevention of deterioration. The Prevention of Deterioration Centre, therefore, was designated as a major supporting consulting and information service to the O.E.C.D. group.

Unfortunately, in 1964 the Prevention of Deterioration Centre closed down due to the reluctance of the US Government to provide further funds (Wessel, 1975), and the O.E.C.D. group, therefore, organised its own scheme to fill the gap left by the closure: thirty-three laboratories in Western Europe and the United States were responsible between them for scanning over 450 journals.

Dr. H.O.W. Eiggins, a lecturer at the University of Aston in Birmingham, was one of the British delegates of the O.E.C.D. research group and recognised the need for an information service for workers in the field of biodeterioration and for non-specialists confronted with occasional cases of biodeterioration. He obtained a grant in 1965 to partially support the establishment of a centre to collect, process, evaluate and disseminate biodeterioration information, and

an important aim of this centre was the interaction between biodeterioration research and information work (B.I.C., 1968).

The grant initially covered the first three years of the establishment and development of the Biodeterioration Information Centre (B.I.C.). The O.E.C.D. reference collection scheme was incorporated in the B.I.C. reference collection scheme and gradually extended to become truly international and include workers in biodeterioration outside the O.E.C.D. group.

This was the basis of the "Cooperating Specialist" scheme where experts in different branches of biodeterioration throughout the world each scanned a small number of journals and sent in relevant references to the B.I.C. The fact that the B.I.C. was established by a practising microbiologist who had contacts among biodeterioration workers made possible the organisation of the Cooperating Specialists scheme.

These specialists were essentially used for specialist journals with some scanning for general papers on biodeterioration done at the B.I.C. (B.I.C., 1966).

Each specialist was sent a number of duplicate index reference cards (size 6" x 4") together with envelopes addressed to the B.I.C. When a relevant reference was found the bibliographic details were put on the top card which the specialist kept for his personal file and the carbon copies were sent every month to the B.I.C. (B.I.C.,

1966). It was felt that such a system would most closely correspond to what an individual would normally do in his literature collecting activities and therefore would cause no inconvenience (B.I.C., 1966).

It became the major source of reference material for the B.I.C., supplemented by some scanning done at the B.I.C. and some output received from external computer services. In 1966 the O.E.C.D. research group designated the B.I.C. as the international information centre for the collection and dissemination of biodeterioration information.

4.3 Initial Growth of the B.I.C. (1965 - 1968)

4.3.1 Services

Initially, the B.I.C. produced one journal, the International Biodeterioration Bulletin (I.B.B.) which contained short notes on new techniques and projects, review articles, descriptions of laboratories engaged in biodeterioration, author abstracts of relevant papers published in other journals, and biodeterioration references obtained from the O.E.C.D. and gradually developing Cooperating Specialists schemes. This journal was published twice yearly and started in a very informal way being cyclostyled within the Biological Sciences Department at Aston University and available free of charge.

By 1967, the number of references collected for dissemination at the B.I.C. along with the increasing number of articles being submitted to I.B.B. necessitated the establishment of a bibliographic journal, the International Biodeterioration Bulletin Reference Index Supplement (I.B.B.R.I.S.) published quarterly.

The creation of I.B.B.R.I.S. coincided with the first public advertising of question answering and photocopy services available from the B.I.C. With the establishment of I.B.B.R.I.S. also came the first charging policy for the B.I.C.'s services: a subscription to each journal was £1.00 per annum with free access to the enquiry and photocopying services.

I.B.B. also became more formalised: by 1967 all papers were refereed and the journal was produced by an external printer.

Circulation figures for the publications and enquiries both showed a healthy growth, although formal advertising of the enquiry service did not begin until 1967:

<u>Circulation Figures</u>			
	<u>1965</u>	<u>1966</u>	<u>1967</u>
I.B.B.	330	850	970
I.B.B.R.I.S.	-	-	400

<u>Enquiry Figures</u>			
	<u>1965</u>	<u>1966/67</u>	<u>1967/68</u>
Enquiries	80	80	221

These figures include technical enquiries on biodeterioration, enquiries about the B.I.C. and its publications, and photocopy requests.

4.3.2. Document Collection and Processing Processing

In 1965 the staff of the B.I.C. consisted of the Centre Head, Dr. Eggins, two graduate assistants and one clerical assistant. The B.I.C. attempted to obtain copies of all documents being published on biodeterioration and on arriving at the Centre these documents were indexed and a thesaurus was gradually built up as indexing progressed. This thesaurus was later published (Willsher, et al. 1967). Keyworded information was stored on feature cards and in addition indexes of information from the reprints were arranged by author, journal title, and institution.

Collection

By the end of 1967 the annual intake was at least 3,000 documents, and much pre-1964 material had still to be collected and the increasing number of papers entering the B.I.C. did mean that more staff were needed.

By the end of 1967 an executive secretary, a part-time research assistant, a shorthand typist and three part-time keyworders had been added to the original staff numbers (B.I.C., 1967).

4.3.4 Comments on the First Three Years

By the beginning of 1968 the B.I.C. had reached a certain level of development and some significant features of this development are detailed in the remainder of this section, using the information presented in the B.I.C. Final Three Year Report (1968).

Firstly, financial support had largely come from O.S.T.I. although contributions were also made by the University and to a lesser extent by a number of other industrial institutions. These institutions are listed in the annual reports of the B.I.C. for 1966/67 (B.I.C., 1967).

The B.I.C. had been established as a national centre while it was thought that other national centres would be set up in certain other countries. In fact, this had not occurred and the B.I.C. had been designated by O.E.C.D. as the international centre for biodeterioration information.

Towards the end of the three year period, the establishment of the B.I.C. at a university resulted in close interaction between research work and information work in biodeterioration. The B.I.C. provided a focus for the development of biodeterioration as a subject and this development was achieved by the training of research workers and by introducing the subject to undergraduate students within the University.

Regarding the location of relevant material the scientific community within biodeterioration had contributed significantly: In 1967-68 there were 148 Co-operating Specialists in twenty-nine countries providing 63% of the Centre's reference input.

Services had been increased during the three year period with the most notable change being the creation of a bibliographic journal, I.B.B.R.I.S., when initially it was anticipated that references could be contained in the original publication, I.B.B.

Significant increases in staff numbers were necessary due largely to the original underestimation of reference intake. The B.I.C. Final Three Year Report (1968) also states that indexing was being done in too great detail particularly as many of the enquiries received were of a general nature. The resulting reduction in indexing depth meant more documents could be indexed with the same staff numbers.

At the beginning of 1968 the subscription rate for I.B.B. was increased to £2 per annum. Nevertheless, the subscription rates were still in no way an accurate reflection of production costs, (Willsher and Eggins, 1969), and the enquiry and photocopy services were still available free. The B.I.C. Final Three Year Report (1968) states:

"It was intended that the services of the B.I.C. should be free but that some form of cost-recovery would ultimately be introduced".

"The general principles of a charging policy are still under consideration. The initial grant period of three years has proved to be far too short for an information service to establish itself in a new subject field and to become financially self supporting. This has probably been due partly to lack of awareness of the importance of biodeterioration and partly to resistance to a new information service. In the development of the Centre emphasis was first put on getting the Centre as widely known as possible by, for example, distribution of free copies of the I.B.B.".

The above quotation outlines the problem faced by most newly established specialised information centres: many such centres are serving developing technologies and one of their functions is to develop the subjects to which they are trying to sell their services. Therefore, these centres cannot take advantage of existing well defined markets for their services. Neither, as they are serving relatively small subject groups can they afford to lose a significant proportion of their potential users. There are, therefore problems of introducing a charging policy particularly in the early stages of a Centre's development.

4.4 The Second Growth Period of the B.I.C. (1968 - 1971)

4.4.1 Introduction

The period 1968 to 1971 can be viewed as the second time period in the Centre's development: the original grant had expired in 1968 but it was renewed for a further three years. The conditions that accompanied this renewal were that the Centre should seek to attain a greater level of financial self sufficiency and that extensive evaluations of the Centre's operations and services should be made (Willsher and Eggins, 1969).

Evaluation of the Centre's internal operations had already begun in 1968 with a study by the Small Business Centre of the University of Aston in Birmingham (1968).

The study recommended increased publicity, with particular emphasis on the trade associations and larger firms, small charges to cover postal and clerical costs of replies to enquiries, the development of testing and advisory services to industry on a chargeable basis, the preparation of a budget with the target of becoming self supporting in three years, and a survey being made to discover the benefits obtained by the users of the services of the B.I.C.

4.4.2 Services

Willsher and Eggins (1969) outlined the B.I.C. charging policy operating in 1969: it was decided to concentrate on generating income from I.B.B.R.I.S. subscriptions. In 1969 the subscription to I.B.B.R.I.S. rose to £4 per annum.

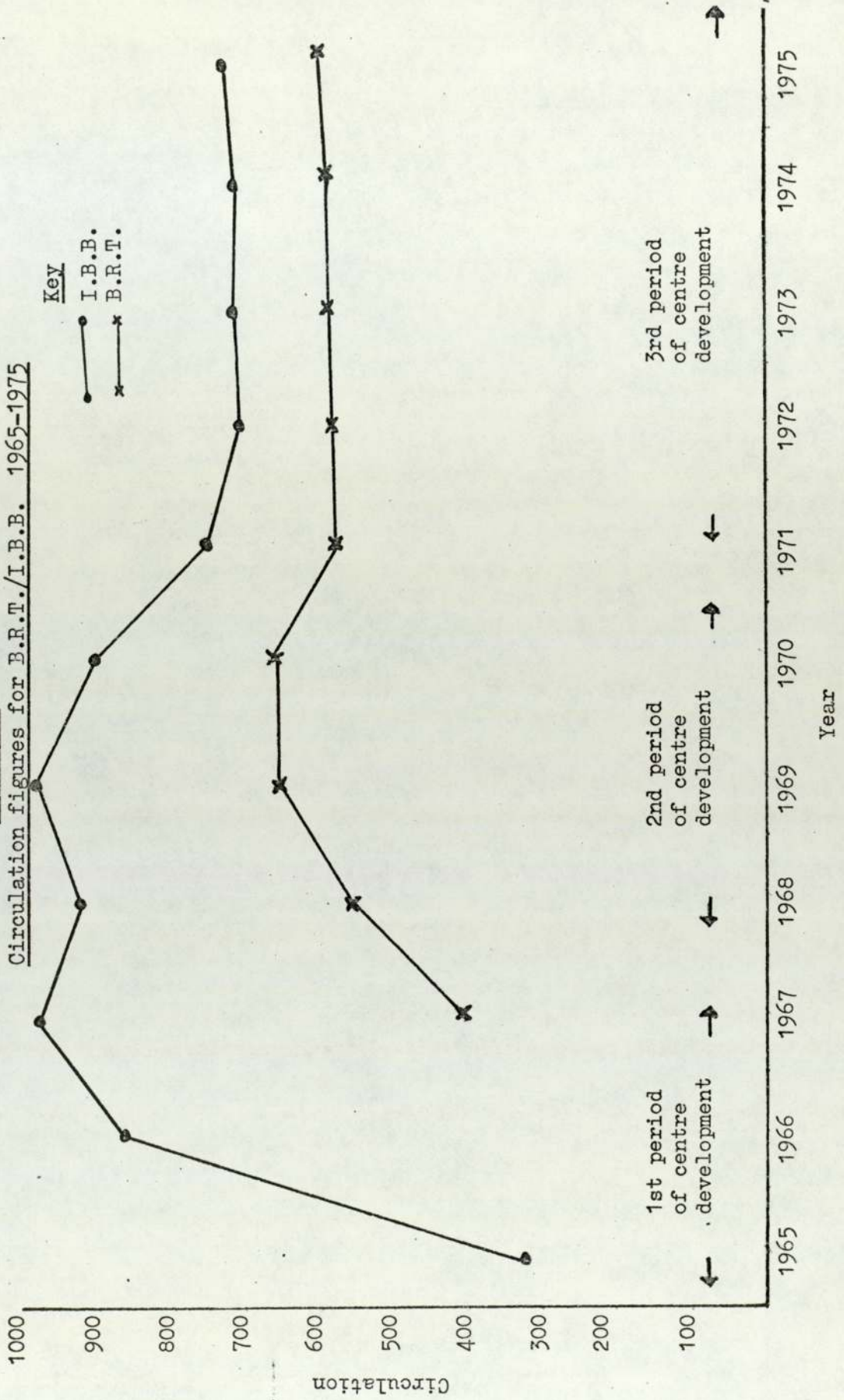
The enquiry service remained free to maintain ease of access to the B.I.C., and hence maintain user numbers and because of the time and expense involved in collecting small and varying amounts from different enquiry lengths and answers given.

In 1969, I.B.B. was published quarterly for the first time and the subscription raised to £4 per annum which covered the cost of the production. The circulation of the publications from 1965 to 1970 is given in Figure 11.

In 1970, enquiries received at the Centre totalled 410 compared with 221 in 1968: of the 410 enquiries received 164 were technical enquiries on biodeterioration, 109 were general enquiries and 137 were photocopy requests.

A glance at the enquiry records for 1970 gives some indication of how far the Centre was fulfilling an international role. For instance, technical enquiries received in 1970 could be divided approximately into a ratio of 80:20 with the first figure representing enquiries from the United Kingdom and the second figure representing enquiries from overseas. However general enquiries could be divided

Figure 11
Circulation figures for B.R.T./I.B.B. 1965-1975



into a ratio of 60:40 with the first figure here representing overseas enquiries and the latter figure United Kingdom enquiries.

The annual report of the Centre for 1969 (B.I.C., 1969) also stated that during the year 139 visitors had come to the Centre with sixteen of these visiting from outside the United Kingdom and representing thirteen countries.

4.4.3 Document Processing and Collection

Collection

In 1969 the number of new and relevant references sent in by Co-operating Specialists fell partly due to a policy of greater selectivity by the B.I.C. and partly because of a greater number of references being located elsewhere, more quickly than through the Co-operating Specialists. An evaluation of co-operating specialist activity was started in the same year (B.I.C., 1970).

Processing

Keywording during this period was brought up to date and in 1970 3650 references were included in I.B.B.R.I.S. compared with 3200 in 1968 (B.I.C., 1971).

There were no significant changes during this period in staff numbers involved with the information services and, for the first time, the Annual Report for 1969-1970 included staff numbers working on biodeterioration research and not directly concerned with the information services: the report mentions twelve staff and research students in this category.

4.4.4 The Creation of a Consultative Council

A major development during this period was the creation of a Consultative Council for the B.I.C. to advise on the B.I.C.'s operations. The B.I.C., the University, O.S.T.I, users and biodeterioration workers were all to be included in the Council's membership and membership from 1969 to 1971 comprised of three University representatives, the Head of the B.I.C., an O.S.T.I. representative, two individuals from government research institutions, two from industrial research associations and two from industrial firms.

4.5 The Third Growth Period of the Centre (1971 - 1975)

4.5.1 Introduction

The third time period encompasses the development of the Centre from 1971 to the present time, Spring 1976. In 1971 the O.S.T.I. grant ended and the result was a number of changes in Centre organisation and activity which essentially produced the service levels which still exist at the present time.

4.5.2 Services

Firstly a new charging policy was introduced to achieve a greater degree of financial self sufficiency without losing too many existing subscribers. The basis of the new scheme was a package-deal including both publications and the enquiry service with three classes of membership (B.I.C., 1970).

The first membership group were "Sustaining Associates" who for £50 per annum could receive up to six copies of I.B.B. and I.B.B.R.I.S., a free enquiry service, and specialist visiting where necessary at cost and overhead expense.

Secondly, "Institutional Subscribers" could receive one copy of each issue of I.B.B. and I.B.B.R.I.S. plus two free enquiries per year, for a subscription of £12 per annum.

"Reduced Rate Subscribers" were the third category of membership. These were Biodeterioration Society members who for a subscription of £6 per year could receive one copy of

each issue of I.B.B. and I.B.B.R.I.S. and two free enquiries per year.

Along with these three categories there were a number of exchange agreements for the journals and the Cooperating Specialists were able to receive I.B.B.R.I.S. free although they paid £6 per annum for I.B.B.

Enquiries received from non-subscribers were answered at a standard rate of £5 for up to one hour's search time although if the enquirer subsequently joined one of the above categories the cost of the enquiry was credited against the cost of the first year's subscription.

I.B.B. and I.B.B.R.I.S. were available separately but at a slightly higher cost while photocopying charges were 4p per page.

The membership categories outlined above are still in existence today although certain price changes have occurred.

Sustaining Associate membership still costs £50 but an Institutional subscription in 1976 is £20 and a Reduced Rate subscription, £10. All enquiries involving a literature search are now charged for, whether from subscribers or non-subscribers: the charge is £8 for a standard two hour search with each subsequent hour costing £5. Photocopy charges have risen to 7p per page in 1976.

There have also recently been three major changes in the services offered by the Centre.

Increasingly throughout this decade the problems of biodegradation and waste materials processing have attracted more attention. At the B.I.C., for instance, in 1973 half the research effort was directed towards biodegradation studies (B.I.C., 1973). As a result of the importance attached to recycling in the economy and to parallel the expansion in biodegradation research the Centre established a new bibliographic journal, Waste Materials Biodegradation Research Titles (W.M.B.) in 1974.

It also became apparent that many technical enquiries were being answered by the use of bibliographies in general subject areas, such as rubber and plastics deterioration, marine fouling, and the microbial corrosion of metals. As a result, it was decided in 1974 to produce formally a number of Specialised Bibliographies in popular subject areas using references previously cited in I.B.B.R.I.S. These bibliographies were advertised and by the beginning of 1976 twelve were available ranging in price from £4.50 to £7.00 according to the number of references included.

The third major development was the growth of consulting work due mainly to an increase in personnel in the Centre able to carry out such work.

Up to 1971 biodeterioration research work had mainly concentrated on the training of research students but short contract work particularly, has become more evident due to, according to the 8th B.I.C. Annual Report (1973)

"the B.I.C. having had the capacity to carry out such work, wishing to augment its funds, and also wishing to fulfil its duty to industry and commerce as part of a technological university." The report also states that

"such contract work is a natural development of the Centre's enquiry services, and in fact most contracts have resulted from enquiries".

4.5.3 Document Collection and Processing

Collection

In 1972, following the investigation of Co-operating Specialist Activity the scheme was abandoned largely because of administrative problems in running the scheme. A number of scientists involved in the scheme, however, along with some previously uninvolved workers, were invited to become "Editorial Advisors" to B.R.T.: they were asked to oversee coverage of their particular subject area in B.R.T. (B.R.T.- Biodeterioration Research Titles, the new name for I.B.B.R.I.S).

J. Martyn began in 1971 a study of external computerised secondary services which up to that point had been used by the Centre on an experimental basis to provide a back-up to other means of locating published information.

The results of the research showed that it was not economically feasible to use these computer services as the major sources of input to the Centre (Martyn, 1974^a).

The abandonment of the Co-operating Specialists scheme and the financial unsuitability of external computer services led to a greater amount of scanning for relevant material having to be done at the B.I.C.

All scanning is now done at the Centre and material for scanning is largely obtained through exchange agreements supported by subscriptions to particularly important services and journals, regular borrowing of material from the British Lending Library, and the scanning of certain journals taken in the library at the University of Aston.

Processing

When the Centre became self supporting it also became apparent that the amount of indexing and keywording of papers entering the system would have to be reduced for economic reasons: in 1970 the thesaurus contained 950 main terms which were allocated to documents in indexing, with an average of six terms being allocated to each document, but in 1971 fifty-three subject classes were devised with the main entry for each document in one class and cross references made from other relevant classes (Garrett and Willsher, 1971).

At the present time there are 221 subject classes arranged by an alphabetical code: AA to IX covers references in B.R.T. and PA to YL covers references in W.M.B.

Up to 1971, keywording was done by external workers and the information recorded on feature cards but this also stopped in 1971. The number of indexes, for retrieval purposes, was reduced so that, at present, there is a Journal Title Index which lists under journal title order all references known to the Centre whether on order, being processed, or in stock, and a classified index arranged according to the classes outlined above, both of which are filed in conventional card catalogues.

The above changes in indexing depth and index numbers led to a reduction in staff involved in the information services, and this reduction in staff has been accompanied by a greater degree of involvement in the information services by the biodeterioration researchers at the B.I.C.

4.6 Service and Personnel Levels at the B.I.C. in 1975

After ten years of development B.I.C. user numbers have begun to stabilise. Figure 12 gives subscriber numbers and enquiry numbers for 1975, and includes subscriber numbers to W.M.B., special Bibliography purchases, and contract research work carried out. Figure 13 outlines the geographical distribution of subscribers to B.R.T. and I.B.B., the two journals studied in this project, and it is obvious from the figures that the journals have reached an international market with the largest subscriber groups in the United Kingdom and the U.S.A. Figures 14 and 15 show some other characteristics of B.I.C. subscribers: firstly Figure 14 shows that subscribers are largely research organisations and universities and colleges, although a large subscriber group of industrial firms is evident in the United Kingdom; secondly Figure 15 details the actual recipients of the journals, according to the B.I.C. mailing lists, with an equal number of subscribers being libraries and individual scientists.

The B.I.C. personnel who maintain these service levels are outlined in Figure 16. Personnel at the B.I.C. total nineteen and apart from the B.I.C. Head and a Visiting Professor, include four research fellows, one research assistant, two research technicians, four clerical staff and six research students. However, no staff member now works full time on the information services and responsibility for the journals and the enquiry service rests with seven people (marked / in Figure 16) who spend part of their time on these activities. Another staff member

Figure 12

User Number Details 19751. I.B.B. (B) and B.R.T. (S)

<u>Subscriber Category</u>	<u>Annual Subscription 1975</u>	<u>Total Copies Circulated</u>	<u>Type of Subscription</u>	<u>Total Subscriber Numbers</u>
Sustaining Associates	£50	119	65 B 54 S	23
Editorial Advisors	S-free B-£5	138	65 BS 8 S	73
Free and Exchange	free	162	66 BS 3 S 27 B	96
Biodeterioration Society Members	B-£7.50 S-£7.50	150	70 BS 3 S 7 B	80
Institutional Subscribers	B-£10 S-£10 BS-£15	749	298 BS 136 B 17 S	429*
	TOTALS:	1318	734 B 584 S	701

2. W.M.B. (W) 1975

Sustaining Associates	£50	37	37 W	(23)*
Institution Subscribers	£10	210	210 W	210
	TOTALS:	247	247	210

3. <u>Enquiry Numbers 1975:</u>	Technical enquiries	100
	General enquiries	92
	Photocopy requests	136

4. <u>Specialised Bibliography Sales 1975:</u>	36
--	----

5. <u>Research Contracts 1975 :</u>	5
-------------------------------------	---

* = 12 organisations took more than one set of BS

() = These subscribers are the same as those in Section 1.

Figure 13

Subscriber Distribution I.B.B./B.R.T (1975)

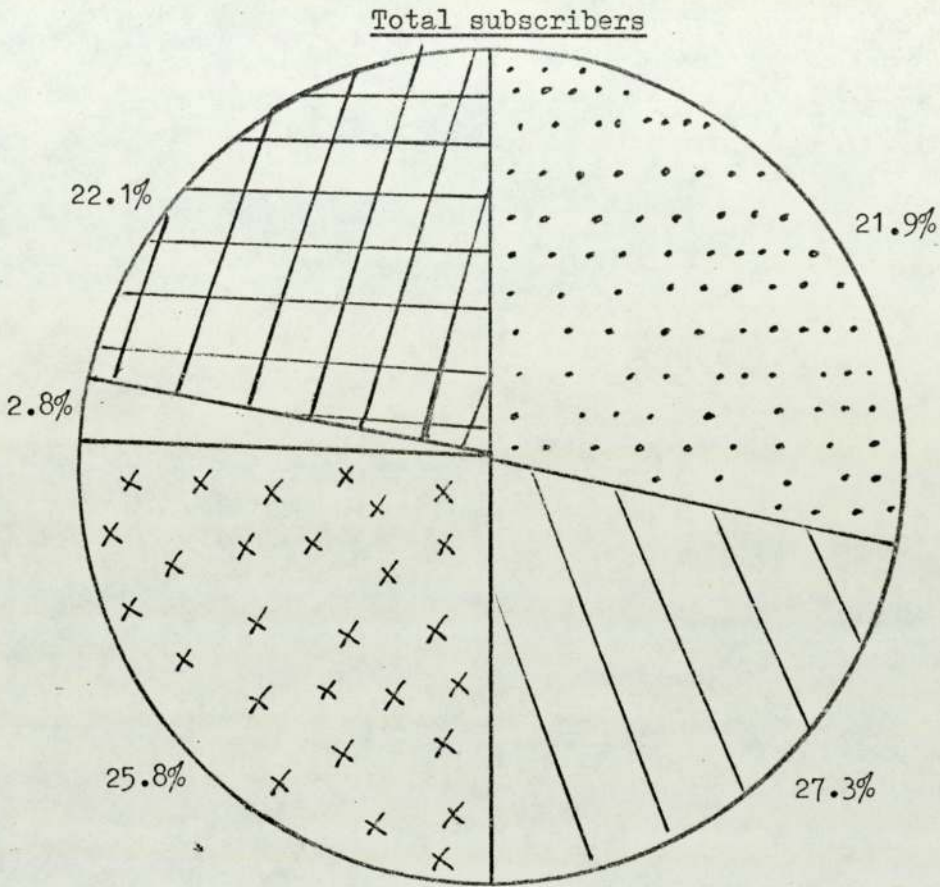
Argentina	1	Netherlands	23
Austria	1	N.Zealand	12
Australia	32	Nigeria	7
Belgium	11	Norway	4
Brazil	4	Pakistan	1
Canada	18	Poland	7
China	3	Portugal	2
Czeckoslovak.	5	Rhodesia	1
Denmark	6	Rumania	4
Eire	3	Singapore	4
Finland	5	S.Africa	8
France	28	Spain	6
Ghana	3	Sri Lanka	1
Greece	2	Sweden	10
Hungary	2	Switzerland	9
India	25	Thailand	2
Iran	2	Tunisia	1
Iraq	1	Turkey	2
Israel	7	Uganda	1
Italy	15	U.K.	196
Jamaica	1	U.S.A.	161
Japan	15	U.S.S.R.	12
Korea	1	Venezuela	1
Malawi	1	W.Germany	24
Malaysia	4	W.Indies	1
Mexico	1	Yugoslavia	1
Nepal	1	Zambia	1

Country Total =54

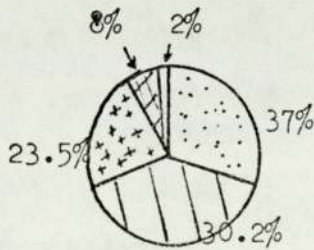
Subscriber Total =701

Figure 14

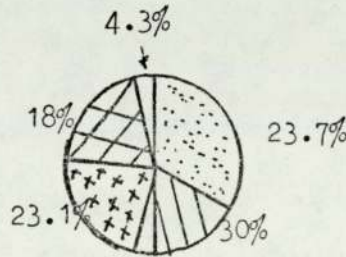
BRT/IBB Subscribers 1975 : Institutional type



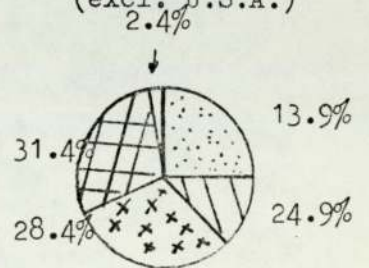
U.K. Subscribers



U.S.A. Subscribers



Overseas Subscribers (excl. U.S.A.)

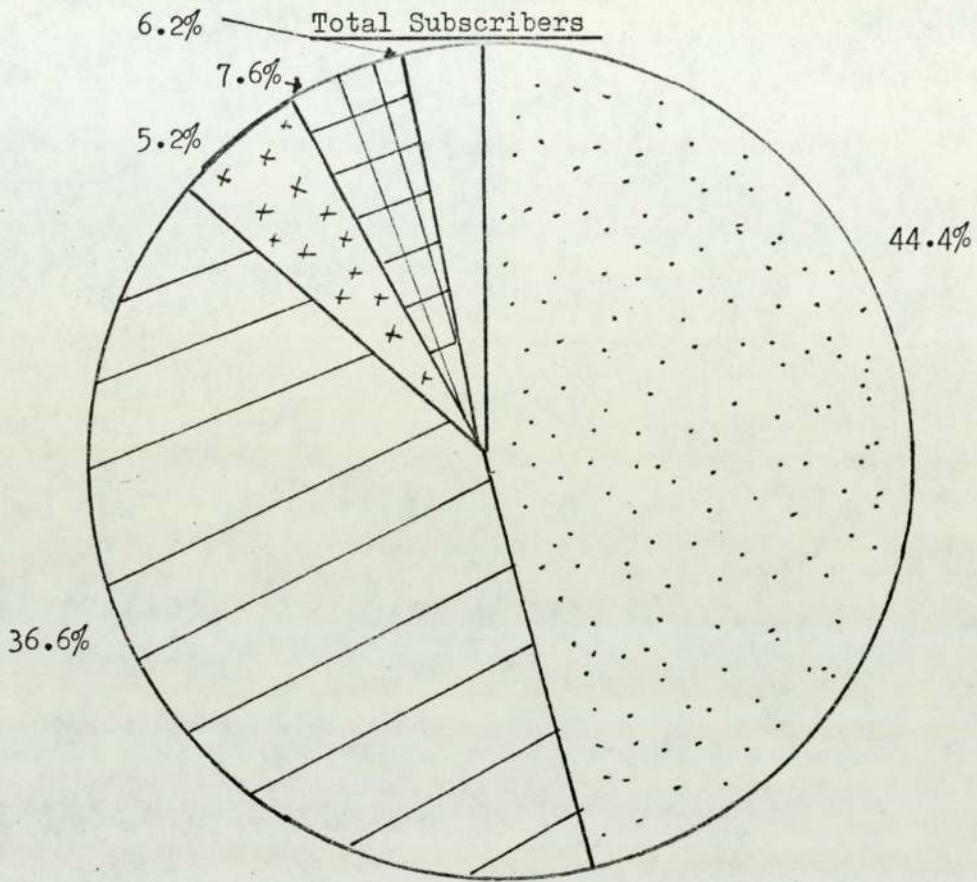


Key

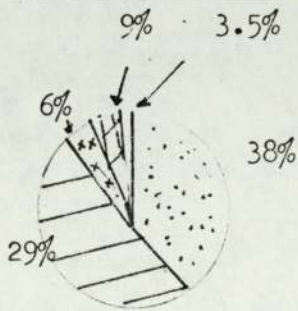
- \\ Industrial Firms
- Universities/Colleges
- xx Research Institutes/Associations
- Individual Subscribers
- ⊞ Other Institutions

Figure 15

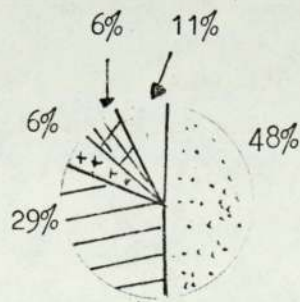
BRT/IBB Subscribers 1975 : Source of subscription within institution



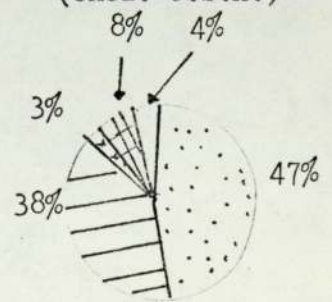
U.K. Subscribers



U.S.A. Subscribers



Overseas Subscribers (excl. U.S.A.)



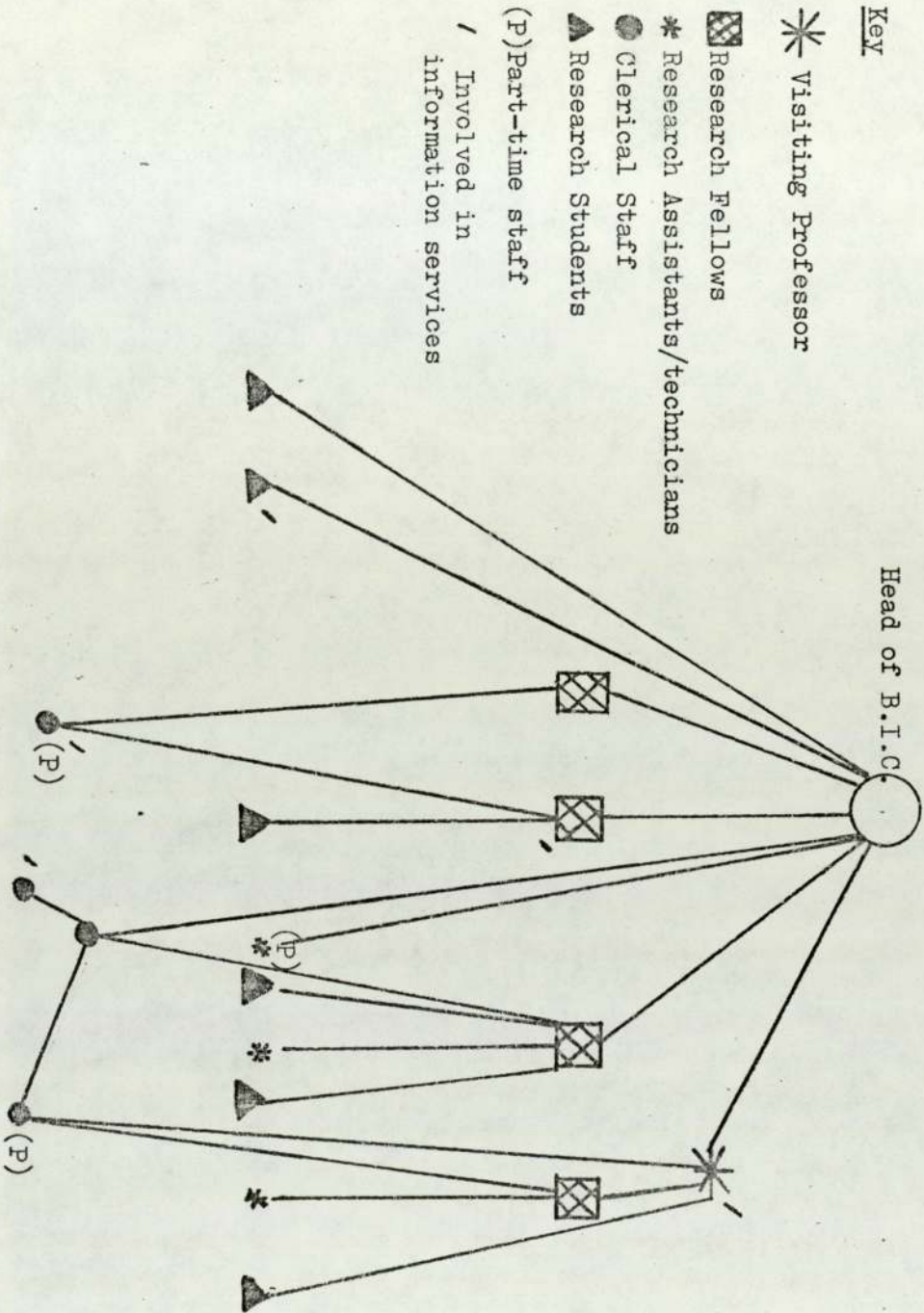
Key

- ⊛ Library subscribers
- ▨ Individual subscribers
- ⊠ Departmental subscriptions
- # Organisation subscriptions
- ⊞ Designated individual subscriber

oversees the contract research service and all personnel contribute a small amount of assistance to the information services by scanning a small amount of material each week or by answering enquiries which cover their subject area.

Finally, all B.I.C. personnel, apart from the Head and one clerical staff member, are financially supported by income from B.I.C. services and contracts, or by grants obtained by the B.I.C. to support a specific piece of work.

Figure 16
Personnel at the B.I.C. -1975



4.7 Conclusion

The B.I.C. throughout its development has involved the scientific community in its activities. The initiative of a group of scientists led to the creation of a biodeterioration information network and in turn the growth of the B.I.C. was dependent significantly on co-operating specialists.

The eventual abandonment of the co-operating specialists scheme reflected the administrative difficulties it produced and the gradual sophistication of the Centre's inputting methods and sources: the increasing amount of biodeterioration literature in various forms could not be adequately covered by a group of specialists covering journals relevant to their field.

Nevertheless, the B.I.C. has maintained considerable links with the biodeterioration community. Its staff are essentially research workers in biodeterioration and through them the B.I.C. is involved particularly with the Biodeterioration Society and the International Biodegradation Research Group as well as many other scientific societies and research groups.

Ten years is probably a good period after which to examine the position of a specialised information centre: Financially, the B.I.C. took around six years to become self supporting. As was realised in 1968 when an extension to the original grant was obtained, a period of three years financial support is not enough to adequately allow a centre

to develop. In the early stages of a centre's growth, for instance, it is difficult to experiment and produce a variety of services which can generate income, as the user population is ill-defined and unstable.

For the Biodeterioration Information Centre it was not until 1971 onwards that a greater variety of services were offered. This was six years after the establishment of the B.I.C. and when for the first time subscriber numbers to the two established journals began to stabilise. They had grown up to 1969, then fallen till 1971, where subscriber numbers for the two main journals are not significantly different from present day figures. Increase in use has come from the creation of the new services, a new regular current awareness journal and regular specialised bibliographies.

Not until the early 1970's were charging policies introduced to cover production costs and it was not until 1975 that regular charging for all enquiries involving a literature search was adapted. Ten years elapsed, therefore, before this specialised information centre was confident enough to charge realistic prices to cover all its services.

The establishment of a centre at a university offers benefits in the form of readily accessible expertise and low cost accomodation and overheads. However, users of a service which originates from a university often assume the service should be free as the university is a publicly supported institution with no profit making motives. It is difficult,

therefore, for a specialised information centre in such a location to charge for its services especially when the centre is not widely known. Although housed in a technological university the B.I.C., in offering a commercial service, also has a role which is often atypical of traditional custom and practice in universities and may find it difficult to establish precedents.

The situation is further complicated when the staff of a centre are researchers in a subject field as other researchers would contact them anyway as part of the informal communication activities of a field of study, and would not expect to have to pay for information received. How many enquiries would have been received by individuals whether the Biodeterioration Information Centre was there or not is difficult to estimate but the fact that scientists do have an obligation to their scientific community, along with the perception of a service located at a university and the general problems of small and ill defined market size which a specialised information centre faces all contribute to the difficulties in introducing a realistic charging policy.

The establishment of a centre at a university should also provide benefits to that university. At the B.I.C., for instance, the general services and the document collection are readily available to university members. The University has also become known as a centre for biodeterioration study and research and the Centre has been able to attract workers in the subject to Aston to study or to give seminars

or lectures. The creation of a commercial information service at a university supporting the scientific and technological manpower of this country and overseas is also a further manifestation of the fact that higher education is aware of and actively catering for the needs of industry and technology.

Also, the B.I.C. does carry out a large number of the functions associated with specialised information centres. It selects, acquires, stores, retrieves and carries out some evaluation of the information it collects and produces current awareness journals and specialised bibliographies and offers an enquiry and photocopy service. These activities are supplemented by the production of the International Biodeterioration Bulletin, a primary journal which means the B.I.C. is directly contributing new biodeterioration information. This journal contains regular review articles as well as articles of original research and as all articles are refereed a selection process is carried out. However, this journal is international in scope and although Centre staff do have articles published there are no regular review producing functions carried out by the B.I.C.. Nevertheless, the presence of a large number of scientists in the body of personnel at the B.I.C. does mean that the potential for the review producing function to become a regular feature of the B.I.C.'s activities is evident. Also, the contact of the B.I.C. with the scientific community could again be utilised to produce commissioned reviews if these were ever considered as an essential part of the B.I.C.'s activities.

Finally, the foreword to the Annual Report of 1973 (B.I.C., 1973) states concisely the achievements of the B.I.C. :

"The concept, eight years ago, of a Biodeterioration Information Centre, in the Department of Biological Sciences, in the University of Aston, linking information, post graduate research, industrial liaison and teaching seemed at the time a somewhat idealist conception hardly realistic in practice. The present annual report should firmly convince any reader that this pipedream has now become a reality and that the Centre is firmly established, and is fulfilling a definite and increasing need in the field of the biological sciences."

Chapter 5Use Patterns of the Centre's Services - 1. BiodeteriorationResearch Titles (B.R.T.)

- 5.1 Introduction
- 5.2 Methodology
 - 5.2.1 Survey sample
 - 5.2.2 Questionnaire design
- 5.3. Survey Results
 - 5.3.1 Library facilities and research personnel
 - 5.3.2 Scanning procedure
 - 5.3.3 Relevant references
 - 5.3.4 Publications not of interest
 - 5.3.5 Other bibliographic sources used
 - 5.3.6 How references obtained
 - 5.3.7 Bibliographic entry
 - 5.3.8 Indexes
 - 5.3.9 Bibliographic entry and indexes
 - 5.3.10 Retrospective searching
 - 5.3.11 Circulation
 - 5.3.12 Other information
 - 5.3.13 Costs and subscriptions
- 5.4 Conclusions

5.1. INTRODUCTION

At the centre of the B.I.C.'s information services are two journals: Biodeterioration Research Titles (B.R.T.) is a quarterly current awareness journal containing references on bio-deterioration and International Biodeterioration Bulletin (I.B.B.) is a primary scientific journal containing contributed articles. This and the following chapter present the results of a survey of a sample of subscribers to the two journals and, in this chapter, B.R.T. is considered. Both journals have been available since the mid-sixties and, with a combined subscription of £15 at the time of the study, users could obtain both journals.

The survey of the B.I.C.'s information services aimed to test the general hypothesis that use patterns vary between geographical areas and also aimed to collect detailed information on use patterns which could be analysed to suggest areas for future service developments and changes.

Prior to the study, little information had been obtained on the use of B.R.T. and this reflects the general lack of evaluation of published indexes and bibliographies. Lancaster (1971), in setting down criteria and procedures for evaluating published indexes, states that a major problem in evaluating the use of bibliographies is that there is no way of controlling or observing their use once they leave an information service. Generally this is true although with B.R.T. it is possible to arrive at some basic conclusions on usage through an examination of the photocopy requests received relating to material in the journal. However, more detailed information requires contact with the user through postal questionnaires and interviews, the methods used in this study.

The complexities of the distribution and composition of E.I.C. users were outlined in the previous chapter (Sec. 4.6) and a user sample was chosen to take account of these complexities. The sample was chosen from subscribers who took out a combined subscription to both journals so that information on both journals could be gathered at the same time and the information was collected through personal interviews and postal questionnaires. The sample also included both U.K. and overseas users to allow a comparison of overseas use and U.K. use to be made. Full details of the sample chosen and the response rates are given in the following section and this sample produced the information for the results discussed in this and the following chapter.

5.2. METHODOLOGY

5.2.1. Survey Sample

First, to precede the survey proper, a pilot study of ten U.K. combined subscribers was carried out to test the questionnaire design and the interview technique.

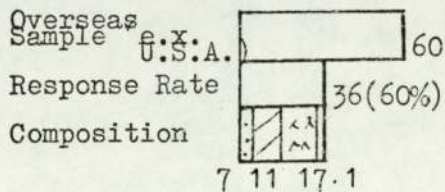
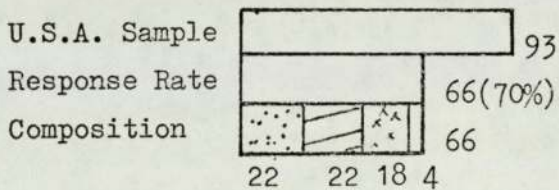
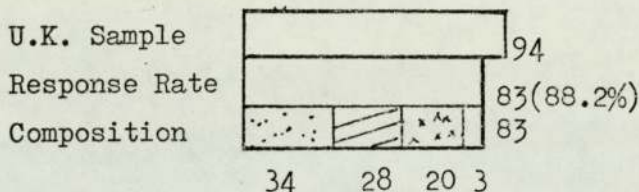
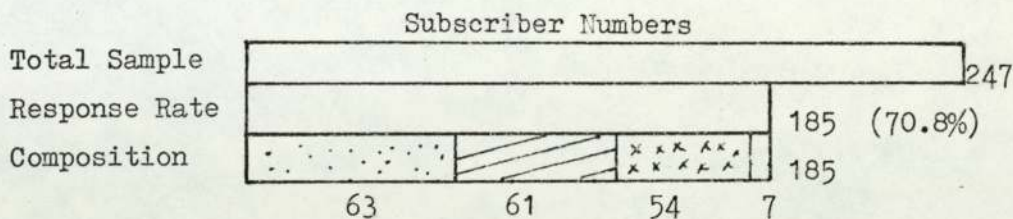
The sample proper was chosen from the U.K. and overseas and was selected to include the following geographical areas: The United Kingdom: the highest number of subscribers are located in this country. Ninety four subscribers were included in the sample (twenty two other combined users were omitted because they either received the journal free of charge or were internal users at Aston University). The proportion of particular institution types in the sample, such as Firms, Universities, and Research Organisations, reflected the general composition of U.K. subscriber. Finance was available from the Department of Education and Science to carry out sixty interviews and a stratified random sample of sixty users was selected to reflect the proportion of each institutional type in the total sample. Requests for interviews were sent to these sixty users and the remaining thirty four subscribers were sent a postal questionnaire.

Six weeks after the initial mailing a response rate of 81.9% had been achieved and a follow up letter increased the response rate to 88.2% (i.e. 83 respondents). Details of the sample composition and respondents are given in Figure 17 .
U.S.A.: The second largest subscriber group is located in the U.S.A. and, after omitting users who obtained the journals free, ninety three subscribers formed the sample and were sent a postal questionnaire.

After a follow up letter, the response rate was 70% and details of the sample and respondents are given in

Figure 17

BRT/IBB Survey Samples and Response Rates



∴ Firms
 // Universities/colleges
 ✕ Research institutions
 Other organisations

Figure 17 .

Europe: Twenty nine combined subscribers in Netherlands, Belgium and West Germany were sent a letter requesting an interview and, after a follow-up letter, the response rate was 78.3% (see Figure 17 for summary details).

Australia: Fifteen combined subscribers were sent a postal questionnaire and the eventual response rate was 73.2% (see Figure 17).

Developing Countries: Sixteen combined subscribers in five developing countries - India, Malaysia, Sri Lanka, Jamaica and Thailand were sent a postal questionnaire. The response rate was 18.7% and summary details are given in Figure 17.

Total Sample

When all the above sub-samples are summed, a total sample of 247 is produced from a total of 532 paying combined subscribers (i.e. 46.4% sample). This sample includes the major B.I.C. user groups in the U.K., U.S.A. and Europe and also includes other areas like the developing countries and Australia to provide a comparison.

The total response rate was 70.8% and summary details of the sub-sample, the total sample and their respective response rates are given in Figure 17 .

Although the response rates were generally good, the response rates from the developing countries were poor with only three out of the sixteen subscribers contacted returning their questionnaire. A major hypothesis of this thesis is that use patterns vary between geographical areas so it is possible that the characteristics and use patterns of

non-respondents in developing countries will be different from actual respondents in other areas. For this reason, any survey results must be viewed with caution in relation to developing countries.

A second characteristic of the responding sample is that it contains a higher proportion of industrial firms than the parent population and this may also introduce a slight bias into the survey results.

5.2.2 Questionnaire Design

Essentially, the same questions were asked with the postal questionnaire as with the personal interviews although with the latter it was often possible to clarify or expand a particular question. Full details of the questions asked are given in Figure 18 but the questionnaire content can be summarised here as consisting of four sections:-

Section 1: obtained general information on the respondents background, work environment, information facilities and general information needs and information gathering habits.

Section 2: obtained specific information on the use patterns of B.R.T.

Section 3: obtained specific information on the use patterns of I.B.B.

Section 4: obtained information on use of other B.I.C. services and any other comments.

Figure 18Questions asked to a sample of subscribers to B.R.T./I.B.B.

Some questions required short written answers while others could be answered by ticking the appropriate suggested answer.

SECTION A -General InformationA (1) - Questions asked to individual subscribers

1. Name of respondent.
2. Name of organisation, and respondent's department.
3. What is your interest in biodeterioration?
4. To the best of your knowledge, are any of the following qualified staff (i.e. staff with scientific degrees in the subjects noted below) employed by your organisation?

Tick if answer YES

Microbiologists
Biologists/Chemists
Staff with other
scientific degrees

Tick if answer
YES

5. Is there a library/information unit in your organisation?
6. Apart from Biodeterioration Research Titles, do you regularly scan any other bibliographies, current awareness services to keep informed of new literature in your subject area? (if answer YES could you please name the ones that you use most often -please do not name more than 5 other services)

A (2) - Questions asked to library subscribers

1. Name of respondent.
2. Name of organisation and respondent's department.
3. What is the general subject area of the library?
4. Approximately how many users does the library serve?
5. If possible, could you state how many of your users are interested in biodeterioration problems?
6. Do you offer any SDI/current awareness services to your users?

Figure 18 cont.SECTION B - Use Patterns of Biodeterioration Research Titles

1. When you receive an issue do you:
 - scan the whole document?
 - scan certain sections?(please state which sections)
 - do not scan (if this answer please state what happens to journal and ignore questions 2,3,4)
2. Approximately how many references per issue would usually be of interest:
 - 0
 - 1-5
 - 6-10
 - 11-15
 - 16-20
 - 21-30
 - 31-40
 - over40
3. (a) FOR INDIVIDUAL SUBSCRIBERS : When you have identified a reference that you think you would like to see, how do you usually obtain the item:
 - by contacting your internal library?
 - by contacting the author?
 - by contacting the B.I.C.?
 - by obtaining a copy yourself from some other institution?
 - other method (please specify)
- (b) FOR LIBRARY SUBSCRIBERS: When a reference is identified which is of interest what steps are normally taken?
4. Do you have any difficulty in obtaining references that you feel may be relevant?
5. Are you not generally interested in any of the publication mediums mentioned below:
 - periodical articles
 - books/monographs
 - reports
 - patents
 - standards
 - theses
 - material in a foreign language
 - others(please specify)
6. Do you find the annotated title entry satisfactory or would you rather pay more for entries with abstracts?
7. Do you find the lack of detailed indexes satisfactory or would you rather pay more for detailed indexes?
8. Are back copies of the journal kept?
9. If answered YES to question 8, have you ever used the journal for retrospective searching?

Figure 18 cont.

10. As far as you know, does anyone else in the organisation scan the journal regularly? (if answer YES, could you say how many people?)

SECTION C - Use Patterns of International Biodeterioration Bulletin

1. Do you scan this journal regularly?(i.e. each issue) (if answer no ignore questions 2-4)
2. What is your regular scanning pattern?:
 - scan the whole document
 - scan all the articles
 - look at contents page and pick out certain sections
 - other method (please specify)
- 3(a) FOR INDIVIDUAL SUBSCRIBERS
~~How many articles from the~~ last four issues have you read? *Interviewees were asked to name the specific articles read.
- 3(b) FOR LIBRARY SUBSCRIBERS
 How many articles from the last four issues have you noted as being of potential relevance?
4. Do you regularly read:
 - the book reviews?
 - the list of conferences?
 - Biodeterioration Society Newsletter?
5. As far as you know, does anyone else in the organisation scan this journal regularly? (if answer YES, could you say how many people?)

SECTION D - Other Areas

1. IBB/BRT are now available on microfiche as well as in the traditional hard copy format. Are you likely to change to a microfiche subscription?
2. Would you ever use the photocopy service at the B.I.C.?
3. Would you ever use the enquiry service at the B.I.C.?
4. Is it likely that your subscription will continue in the near future?
5. Have you any other comments to make on BRT/IBB i.e. layout, coverage frequency, content, price etc?

Please feel free to make any other comments not covered by the questionnaire.

5.3. SURVEY RESULTS

5.3.1. Library Facilities and Research Personnel

Before considering the specific use patterns of respondents background information was obtained on the library facilities available in respondents institutions and the presence of qualified scientists in the institutions.

Library Facilities

All respondents - in the U.K. and overseas - were able to provide information on the availability of library facilities and the results are shown in Figure 19 . Clearly, only a small minority of respondents did not have access to a library in their institutions although as no strict definition of a library was given in the questionnaire, the positive replies covered unmanned rooms with shelves of periodicals, libraries run by clerical staff, libraries run by professional staff and internal computerised information services.

Nevertheless, the general conclusion is that most respondents already have access to some sort of information base and that the B.I.C. is an additional external service. Most respondents also scan other bibliographies, as well as B.R.T. and this point is considered further in section 5.3.5.

Research Personnel

Qualified research personnel were defined as anyone with a scientific degree and respondents were asked whether there were (a) any microbiologists in their institution, (b) any biologists or chemists and (c) personnel with any degrees in other scientific subjects on the staff. Only a small percentage of respondents had no scientifically qualified

Figure 19

% of responding institutions without library/information facilities

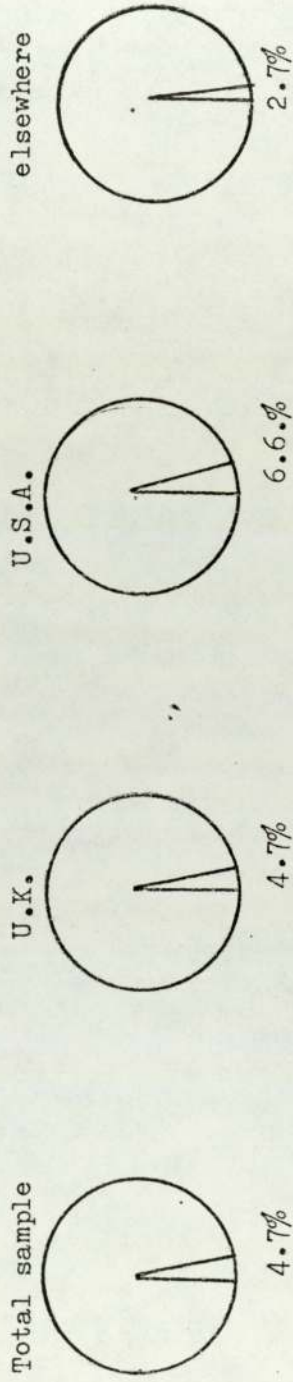
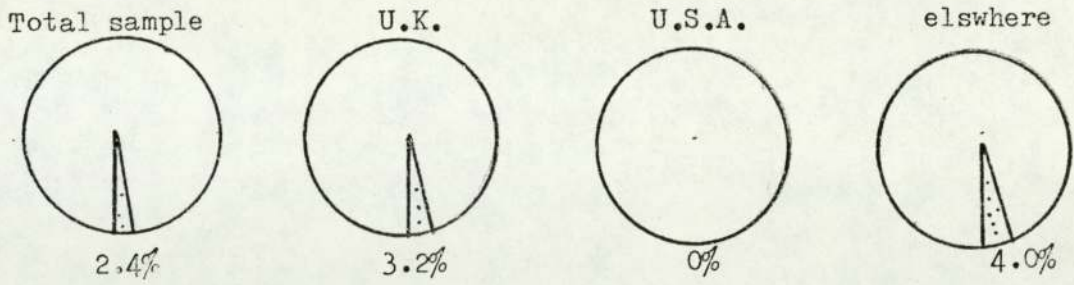
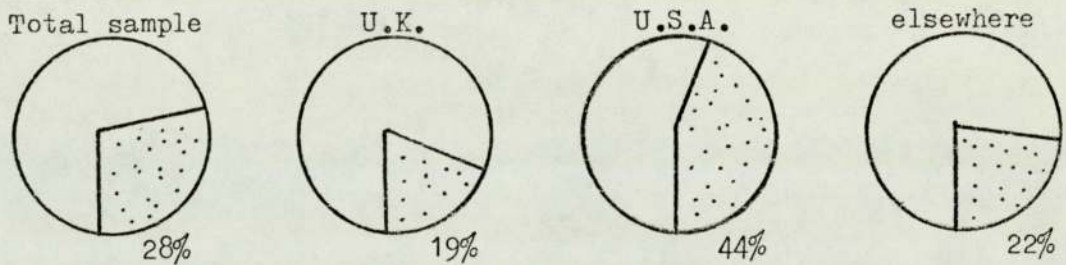
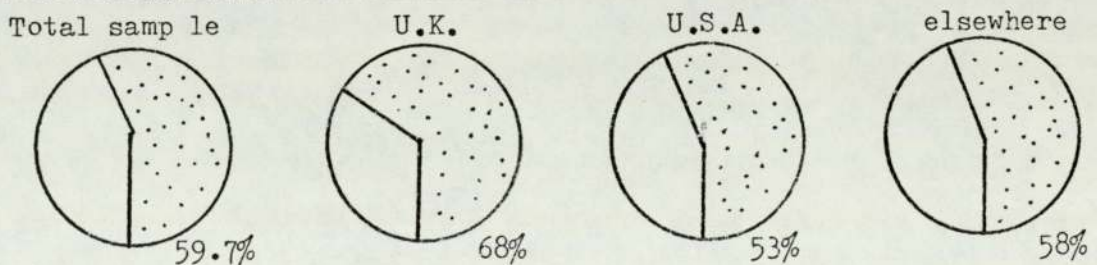
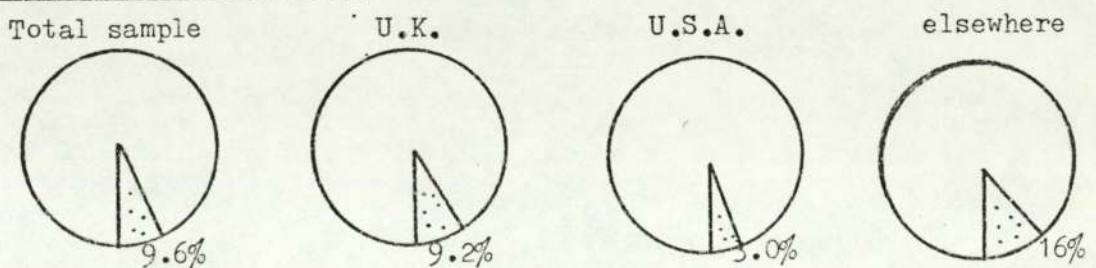


Figure 20

% of responding institutions without qualified scientific staff% of responding institutions with qualified microbiologists% of responding institutions without qualified microbiologists but with qualified chemists/biologists% of responding institutions without above qualified staff but with other qualified staff

staff as Figure 20 shows. The remaining percentage had some qualified personnel and, as might have been expected, the majority of personnel identified had general biology or chemistry degrees with a smaller amount possessing microbiology degrees. A much higher percentage was recorded for institutions possessing qualified micro-biologists in the U.S.A. than elsewhere and this is likely to reflect the higher number of micro-biology degrees available in the U.S.A.

Institutions without microbiologists on their staff usually had qualified chemists or biologists and, finally, a small percentage of respondents had no microbiologists, biologists or chemists but scientifically qualified staff in other subjects.

5.3.2. Scanning Procedure

As B.R.T. is a general current awareness journal, it would seem likely that each new issue would be scanned by recipients for new references on biodeterioration. However, when respondents were asked to state their scanning patterns, it became apparent that a large minority of respondents never scanned B.R.T. There are 125 subject sections in B.R.T. (See Figure 5) and details are given below of how far the sample scanned these sections when a new issue arrived:-

SCANNING PATTERNS OF TOTAL SAMPLE

<u>Scanning Pattern</u>	<u>% of Total Respondents</u>	<u>% of sub-samples</u>		
		<u>U.K.</u>	<u>U.S.A.</u>	<u>elsewhere</u>
Did not scan	24.5	27.7	34.8	11.1
Scanned some sections	27.2	28.9	30.4	22.2
Scanned all BRT	48.3	43.4	34.8	66.7
TOTALS	100	100	100	100

66% of the non-scanners were library subscribers and the journal, on arrival, was either placed on display in the library or filed. Where a journal was not scanned by the librarian but circulated then the first individual on the circulation list was contacted and his scanning procedure included in the above figure . However, the fact that a large minority of librarians never scanned E.R.T. on arrival and that they were unable to offer any indications of its use by staff members shows that, even with a user survey, it is still difficult to discover the ultimate user or users, if any, of a bibliographic service. It is also interesting to note that this minority of respondents are subscribing to E.R.T. without apparently knowing the extent of its use.

The remaining 34% of non-scanners were all individual subscribers and over 90% of these stated that they used E.R.T. for searches occasionally but that their main area of work was not in biodeterioration but in a related subject area.

Where only certain sections were scanned it is noticeable that a particularly intensive area of scanning exists amongst the 125 subject sections and that this scanning pattern emerges in all three sub-samples in the U.K., U.S.A., and elsewhere overseas.

27.2% scan only certain subject sections in E.R.T. and the number of sections scanned varies from one to twenty five. However, the major area of scanning lies between the classification codes F.B. (Lignin) and H.C. (Packaging) and this area includes all the timber sections. (details of the alphabetical classification code are shown in Figure 5). 80% of those scanners who scan only certain sections cover the

area between classification codes F.B. and E.C. and 68% scan only sections in this area.

5.3.3. Relevant references in each issue

It is difficult to measure 'relevance' in a study of a general current awareness service as the service is not aimed at the needs of a particular individual and, in this study, there was no time to follow through the activities of a respondent once he had identified a potentially relevant reference in B.R.T.: therefore there was no way of measuring the usefulness or relevance of a particular reference.

Given the scanning patterns outlined in the previous section, the results here give some indication of how many references, from each issue of B.R.T. a respondent would normally try and obtain or see, or put into his document collection. These figures provide some information on the general usefulness of B.R.T. The replies from respondents were grouped into units of five and the resultant figures are tabulated below:-

References per issue followed up by respondents

<u>Reference</u>	<u>%of sub-samples</u>				
	<u>Numbers</u>	<u>Total %</u>	<u>U.K.</u>	<u>U.S.A.</u>	<u>elsewhere</u>
0		.5	1.6	-	-
1-5		69.1	73.4	45.2	88.5
6-10		22.2	18.3	43.2	5.25
11-20		5.6	3.35	6.9	6.25
21-30		2.0	3.35	2.7	-
31-40		.6	-	2.0	-
over 40		-	-	-	-

Firstly, the above sample does not include those respondents, identified in the previous section, who do not scan B.R.T. on arrival. The sample only includes those respondents who scan B.R.T. on arrival.

Secondly, it has been assumed that respondents generally obtain a similar number of references with each issue and the comments made by respondents would seem to support this assumption.

Accepting the above points, the figures indicate that the majority of scanners - approximately 70% of the total respondents - obtain 1% or less of the reference total in each issue of B.R.T. (i.e. there are approximately 450 references in each issue of B.R.T. and 70% of sample obtain between 0 and five references). Also, only 2.6% of the respondents obtained over 4.6% of the reference total regularly and none of the respondents obtained over 8.8% of the reference total on a regular basis.

Two other points emerge from the figures. Firstly, the average number of references obtained per issue is higher in the U.S.A. than elsewhere and this is perhaps surprising given the wide variety of information sources that exist in that country. Secondly, the previous section noted that the largest number of respondents who scan B.R.T. throughout are found in overseas areas, outside the U.S.A., yet the figures for references obtained per issue from these areas show that they also contain the greatest percentage of respondents who obtain less than 1% of the references per issue. This is also a little surprising as the overseas sample contains developing countries and non-English speaking countries where it might have been assumed that users would not have easy

Figure 21

BRT Reference Composition by Medium of Publication

<u>Medium</u>	<u>1969</u>		<u>1975</u>	
	<u>No's</u>	<u>%</u>	<u>No's</u>	<u>%</u>
Journal	1874	87	1003	61.7
*Reports	95	6.92	119	9.0
Technical Notes	30		18	
Leaflets	9		6	
Newsletters	15		6	
Conference Procs.	58	2.69	250	15.3
Books, monographs	23	1.07	46	2.8
Newspaper reports	23	1.07	2	0.1
Patents	14	0.65	141	8.6
Non-serial review	10	0.46	3	0.1
Standards(DIN)	1		20	1.2
Specifications	1		1	
Theses	1		4	0.2
+Preprints	-		1	
+Bibliographies	-		3	0.1
	TOTAL 2154		TOTAL 1623	

Classification of publication medium and 1969 figures taken from Martyn (1974).

* Distinction between mediums unclear, therefore grouped together (as Martyn 1974)

+ Mediums of publication not included in Martyn classification

access to many English language publications through other information services.

5.3.4. Publications not of interest

B.R.T. aims to be comprehensive not only in geographical areas covered but also in the medium of publication and language covered. Therefore, the extent of user interest in the various publication forms and languages is important: users' comment may indicate that certain publication types could be omitted from B.R.T. without reducing its effectiveness.

Before considering respondents' comments, Figure 21 provides a breakdown of the reference composition, by medium of publication, of B.R.T. in 1975. A comparison is also made with the 1969 figures, taken from Martyn (1974^a). Noticeably, the only major percentage changes between 1969 and 1975 relate to journal articles and conference proceedings, with the former's share being reduced by over 25% and the latter's share increasing by 12%: the increase in conference proceedings is probably due to the increasing amount of material being published as conference proceedings and the increasing ability of the B.I.C. to gather information in all publication media.

Also, in 1975, 3.5% of B.R.T. references were in a language other than English and 91% of this foreign language material came from European countries - notably France and Germany, but also Italy, Spain, Norway, Sweden and Belgium.

Given this reference composition, respondents appeared to have few limitations on the types of publications that they were interested in:-

56% of the total sample were interested in all publication media and, the only publication media mentioned by a significant group of respondents as not of interest were patents

and standards, 19.3% of respondents were not interested in patents and 17.9% were not interested in standards as the table below shows:-

	<u>% of respondents not interested in patents or standards</u>			
		<u>% of sub-samples</u>		
	<u>Total %</u>	U.K.	U.S.A.	elsewhere
Not interested in patents.	19.3	28.9	12.5	16.6
Not interested in standards	17.9	19.2	18.0	16.6

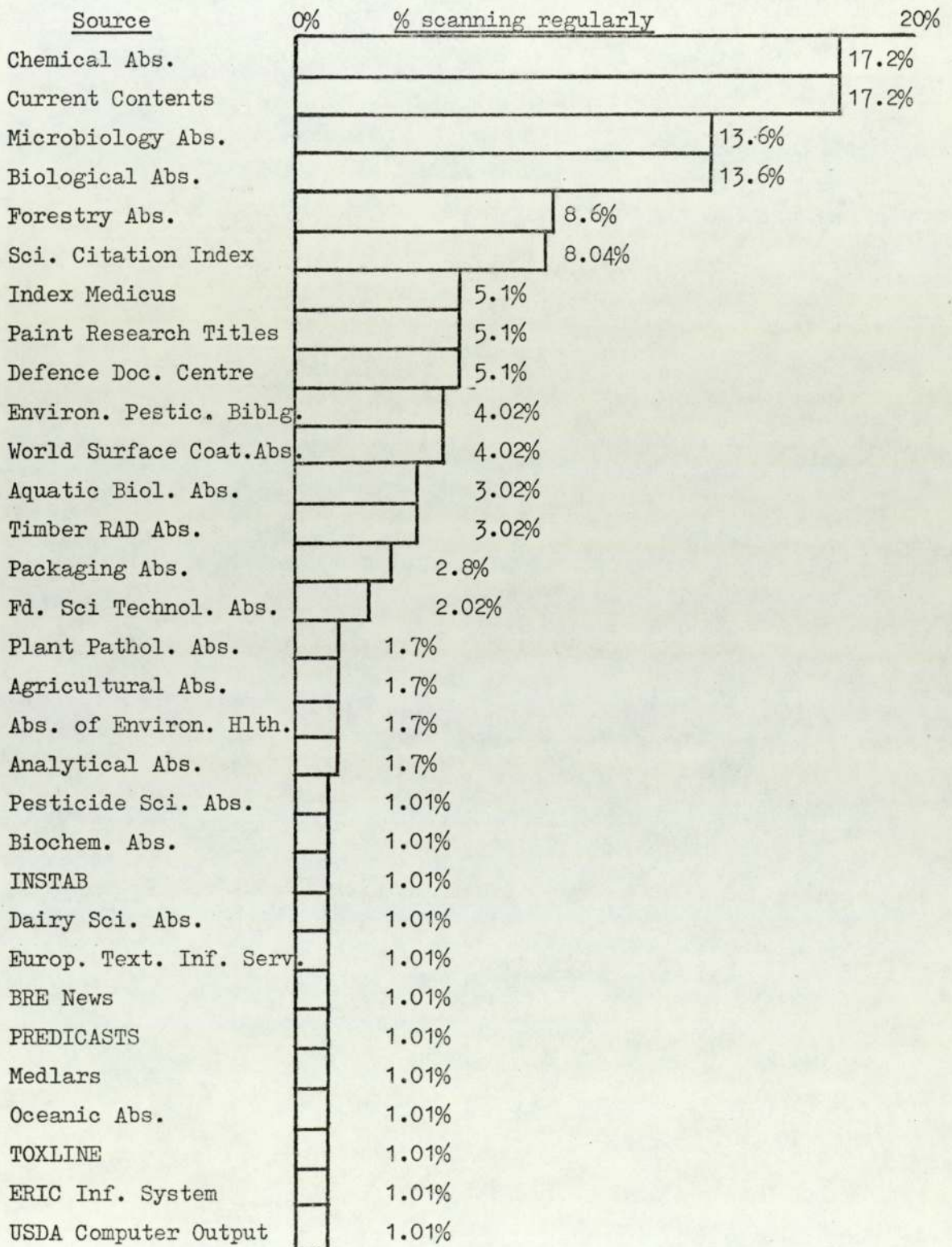
Also, most respondents indicated that they were interested in material which was written in a language other than their native language. Only 12.7% of respondents expressed limitations on obtaining foreign language material and the majority of these were located in the U.K. and six in the U.S.A. Even with these respondents, however, the limitations did not always cover all foreign languages: nine respondents stated that all foreign language material was ignored, three respondents were only interested in Western European languages, one respondent obtained relevant material in French and German as well as English and four respondents excluded only two or three languages from their searches - notably Japanese and Russian but also other Far Eastern languages and Italian.

5.3.5. Other Bibliographic Sources used for Current Awareness

Another factor affecting the use of B.R.T. is likely to be the use made of other external bibliographic sources so respondents were asked to detail any other services regularly scanned for references on biodeterioration. The problem with this question is that many respondents, particularly librarians, are likely to scan bibliographic services not just for references

Figure 22

Other major bibliographic sources used by respondents



on biodeterioration but for references on other subjects as well and their use of other information services, therefore, will be geared to more general information needs.

Accepting this limitation, Figure 22 details those services mentioned by more than one respondent. Twenty seven services were mentioned by respondents and thirty one of these were mentioned by more than one respondent and are included in Figure 22. The average number of other services stated was 1.5 and the highest number of other services scanned was 5:-

Number of other services scanned

<u>Number</u>	<u>% of respondents</u>
0	13.2
1	46.5
2	24.6
3	8.6
4	4.5
5	2.8

The existence of a wide variety of alternative services may partly explain why many users obtain only a few references from B.R.T. although, as the above table shows, 84.3% scan two or less of these alternative sources.

Interestingly, only five of the seventy seven services identified provide input to the I.R.T. and four of these are included in Figure 22 : 'Current Contents' provides 22% of the input to B.R.T. and Microbiology Abstracts, Paint Research Titles, and World Surface Coating Abstracts add another 7% to the B.R.T. reference input. No respondent scanned all

four sources but a number of respondents did scan Current Contents and one or more of the other three sources. This suggests that a certain percentage of references in B.R.T. will already have been seen by the small percentage who scan Current Contents and the other services mentioned as the following figures show:-

9.9 9.6% of respondents who scan Current Contents are likely to have seen 22% of the references in B.R.T.

4.4% of respondents who scan Current Contents and Microbiology Abstracts are likely to have seen 23.5% of the references in B.R.T.

1.1% of respondents who scan Current Contents and Paint Research Titles are likely to have seen 24.5% of the references in B.R.T.

1.01% of respondents who scan Current Contents and World Surface Coating Abstracts are likely to have seen 25% of the references in B.R.T.

Finally, of all the services mentioned, only one, I.N.S.T.A.B. (Information Service on Toxicity and Biodegradability) could be said to be directly competing with the B.I.C.: even here, I.N.S.T.A.B. places more emphasis on collecting documents related to toxicity and pollution rather than documents concerned with biodeterioration problems specifically.

5.3.6. How references are obtained

Another factor affecting the use of a bibliographic service is the availability of hard copies of the cited documents: if users are unable to obtain copies of documents cited then

the usefulness of the service is significantly reduced. In this respect, the B.I.C. provides two channels to aid accessibility. Firstly, the B.I.C. provides a photocopying service covering most documents included in B.R.T. and secondly, where possible, the addresses of authors are given as part of the bibliographic entry in B.R.T.

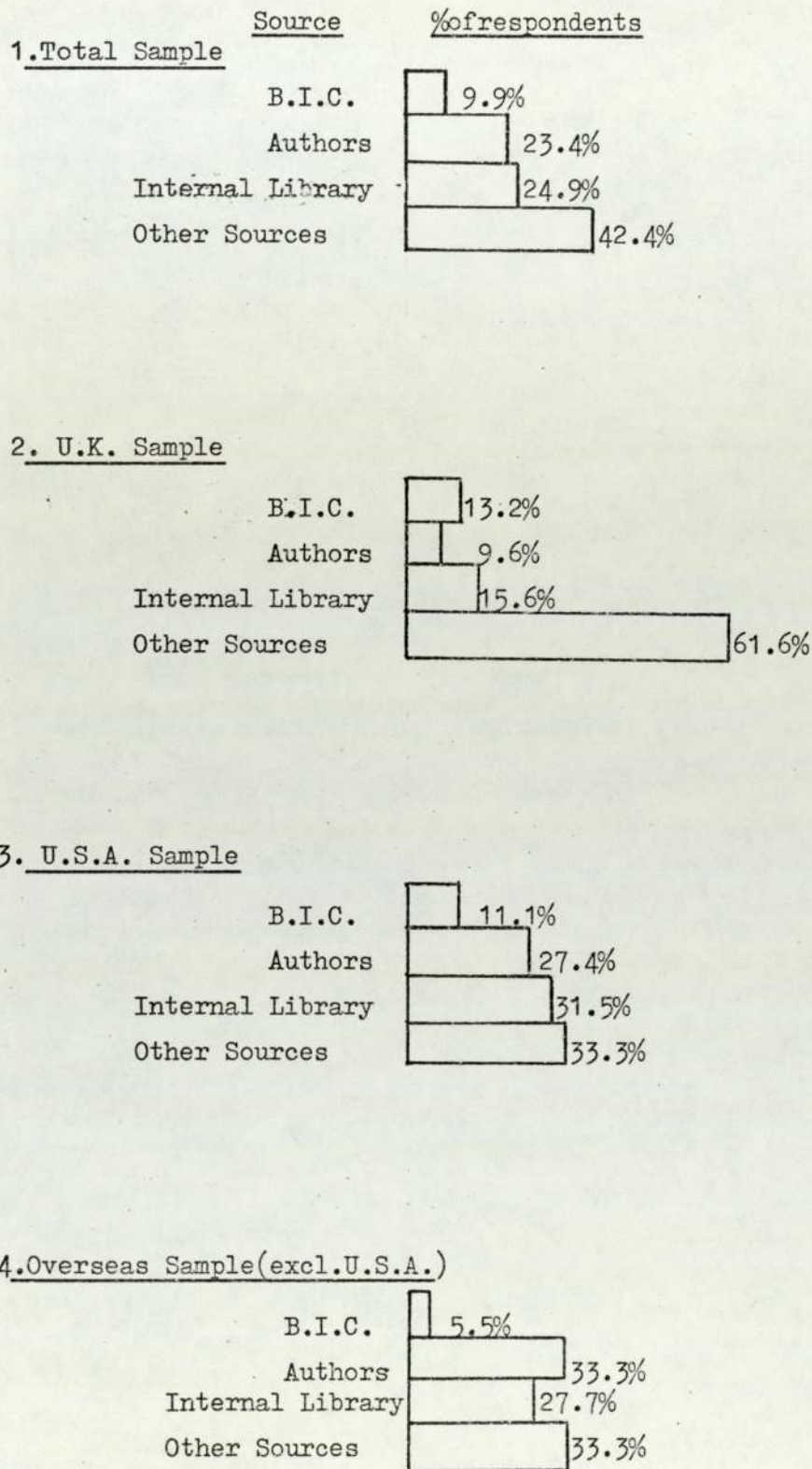
Respondents were asked to identify the sources that they normally used to obtain references to discover if references were easily obtainable and to assess the use made of the B.I.C.'s facilities.

Unfortunately, the phrasing of the question in the postal questionnaire produced some inconclusive answers (a number of respondents stated that they used their internal library to obtain references but no detailed information on the libraries' sources of references could be obtained) but it was still clear that little use was made of the B.I.C. to obtain hard copies. Only 9.9% of the responding sample used the B.I.C. regularly and only 1.1% used the B.I.C. as the single source of hard copies. This suggests that the availability of hard copies is a low priority factor affecting subscriptions to the B.I.C. and this view is supported by the low usage figures for the photocopying service in general (See 7.7). This raises the question as to whether the maintenance of a comprehensive document collection is necessary and this point is discussed in Section 5.4 .

The main sources of references are outlined in Figure 23 and, although the B.I.C. itself is used very little, it is apparent from the figures that authors are used as reference suppliers by a significant minority of respondents

Figure 23

Sources used by respondents to obtain copies of references cited in BRT



outside the United Kingdom. Therefore, the inclusion of the author's addresses in F.R.T. would appear to be justified.

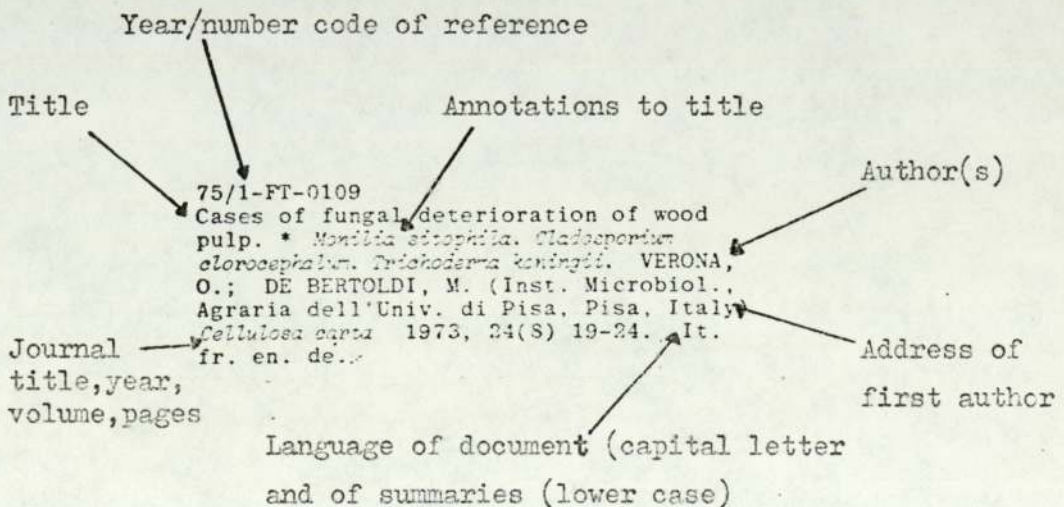
A variety of organisations are represented by the 'other source' category - thirty six agencies were identified by respondents - but in the United Kingdom, as might be expected, this category is dominated by the British Lending Library (E.L.L.): 49.3% of the total U.K. responding sample use the B.L.L. as their regular source of references.

Finally, very few respondents appeared to have difficulties in obtaining references included in B.R.T.: 2.2% suggested that they had occasional problems particularly with foreign language material.

5.3.7. Bibliographic Entry

The bibliographic entry is the tool through which the relevance of an item, along with its location, author, language, size and date, is indicated so the amount of information contained in it is another important factor affecting the use of a bibliographic journal.

Shown below is a typical bibliographic entry from B.R.T.:



This is the standard entry (slight variations occur with certain publications such as patents, standards, monographs and theses) and respondents were asked whether they found the entry satisfactory and, in particular, the information contained in the annotated title entry.

Given a choice, a reasonable assumption must be that most people would prefer abstracts to annotated title entries but the question in this survey was phrased as follows: "Do you find the annotated title entry satisfactory or would you rather pay more for entries with abstracts?". The responses to this question are tabulated below:-

Satisfaction with annotated title entry

	<u>Total %</u>	<u>% of sub-samples</u>		
		U.K.	U.S.A.	elsewhere
Satisfied with entry	67.5	88.0	65.0	50.0
Would pay more for abstracts	32.5	12.0	35.0	50.0

The majority of respondents were happy with the present arrangement and, generally, respondents felt that enough information on the relevance of an item could be obtained from the title.

In the U.K. and the U.S.A. the majority of respondents were satisfied with the present entry but elsewhere overseas there was a high percentage (50%) in favour of abstracts. This figure is largely a result of the high number of respondents in Europe requesting abstracts. Perhaps language difficulties limit the value of a title to provide information and thus increase the need for abstracts in European countries.

Some respondents also felt that the annotations to the titles were used inconsistently. Up to 1971 documents were allocated keywords selected from a thesaurus produced at the centre but since then the thesaurus has not been used and added keywords have been allocated to a title when an indexer has considered this necessary. It may be that some written basic guidelines should be developed particularly in the present situation where a number of indexers are involved in document indexing.

Generally, however, most people found the annotated title entry satisfactory and also the remainder of the entry. One point was mentioned by more than one respondent:

50% felt that the general order of the entry could be improved by heading it with the author's names in bold type, rather than with the title: up to 1972 the entry was headed by the author details in bold type but the present entry arrangement allows for more entries per page.

5.3.8. Indexes

The availability of indexes may also be a factor affecting usage: there are no detailed indexes to B.R.T. and only a general classification at the front of each issue (See Figure 5). supported by a cross-referencing system. At the end of each subject section in F.R.T. cross-references are given to other references in that particular issue which might also be of interest. The cross-reference contains only the letter/number code of the reference: for example, See 75/3 - 1093 or See also 75/3 - 1228.

Again, the question was phrased as follows: "Do you find the lack of indices satisfactory or would you rather pay more for indices in each issue?". The responses are tabulated below:-

Satisfaction with absence of indexes

	Total %	<u>% of sub-samples</u>	
		U.K.	U.S.A. elsewhere
Satisfied at present	68.0	60.0	74.0
Would pay more for indexes	32.0	40.0	26.0

The majority of respondents were unwilling to pay more for detailed indices although, unlike the question on entries with abstracts, the largest minority of dissatisfied respondents were in the U.K.

The 32% in favour of indices was largely made up of two groups:-

- (a) those who did not scan E.R.T. - perhaps indices would encourage the scanning, and,
- (b) those who scanned the whole of B.R.T. -

this suggests that their present scanning pattern does not reflect an interest in the whole of E.R.T. but rather reflects the need to scan the whole of P.R.T. to find relevant references. This point was amplified by a number of respondents who expressed doubts over the consistency of the cross-referencing system: as with annotations, crossreferences are included when an individual indexer thinks they are required but, as a number of people are involved in indexing and in the absence of detailed indices it might be appropriate to lay down basic guidelines for cross-referencing.

5.3.9. Bibliographic Entry and Indices

Finally, in this section, it is worth noting that only a small minority were willing to pay for both abstracts and indices:-

Satisfaction with absence of abstracts and indexes

	Total %	% of sub-samples	
		U.K.	U.S.A. elsewhere
Satisfied at present	83.8	90.4	83.0
Would pay more for abstracts/indexes	16.2	9.6	17.0

Therefore, there appears to be little justification for developing either of these areas, particularly if refinements to the annotations and cross referencing system can be made.

5.3.10 Retrospective searching

Although E.R.T. is essentially a current awareness journal 97% of respondents stated that they kept back copies of the journal. The amount of retrospective searching of E.R.T., however, is relatively low as the figures below show:-

Use of E.R.T. for Retrospective Searching

	<u>% of Total Respondents</u>
Respondents who have searched E.R.T. retrospectively	38.5%
Respondents who have not searched E.R.T. retrospectively	61.5%

There were only slight variations in the percentages received from the U.K. and from overseas and the major reason given for non-use of E.R.T. retrospectively was that other services were more comprehensive. Interviewees, for instance, generally named the discipline-orientated services, such as Chemical

Abstracts and Biological Abstracts, as the services used most for retrospective searching. The discipline-orientated services tend to have the largest retrospective files and, also comprehensive indices and, regarding the latter point, it is interesting to note that the majority of respondents who had used B.R.T. for retrospective searching had also expressed a willingness to pay more for detailed indices in the previous question.

38.5% had searched B.R.T. retrospectively and 70.5% of these respondents had also stated that they would be willing to pay more for indices (the 70.5% represents 85% of the total respondents willing to pay more for indices): this suggests that retrospective searching would not be greatly increased by the inclusion of indices but that any indices would simply aid users already searching B.R.T. retrospectively.

The low use of B.R.T. retrospectively may also be related to the fact that the B.I.C. offers a retrospective search system to subscribers, through its enquiry service and this service was free, up to April 1975. However, few subscribers have ever taken advantage of the free enquiry service (7.5.3) and of the respondents in the survey sample, only 19% had ever used the enquiry service. Finally, in the section on scanning patterns of B.R.T. (Section 5.3.2) it was noted that 24.5% of the sample never scanned B.R.T. on arrival. 70% of these non-scanners also never used B.R.T. for retrospective searching nor knew of anyone who had used B.R.T. retrospectively.

5.3.11 Circulation

The responses analysed in the previous sections have all come from the subscriber name listed on the B.I.C.'s mailing lists. In many instances, however, the journal is likely to be seen

by more than one person and, as a result, the previous figures will underestimate the use made of B.R.T.

It has not been possible to contact every user of B.R.T. in the individual organisations sampled but to arrive at some estimate of B.R.T. user numbers, respondents were asked whether other individuals in their organisation scanned B.R.T. The resultant circulation figures are plotted on Figure 24 - although these figures are likely to underestimate actual circulation figures for two reasons: firstly, 28% of respondents, particularly non-scanners, were unable to say whether other people saw B.R.T. or not and these responses have been plotted on the graph in the "one user" column; secondly, 7.5% stated that the journal was seen by other people but they were unable to give exact user numbers so it has been assumed that the minimum number of persons more than one (i.e. two) see the journal.

Despite the likelihood of underestimating, however, it is still apparent that in the majority of instances B.R.T. is seen by more than one person and that actual user numbers will be much higher than the recorded subscriber number of 701. The stated number seeing each issue of B.R.T. ranges from one to ten in the U.K., one to twenty five in the U.S.A. and one to eleven elsewhere overseas. The replies from the sample of 185 respondents produced a total readership of 647 persons per issue of B.R.T. :the average number seeing each issue was 3.4. persons.

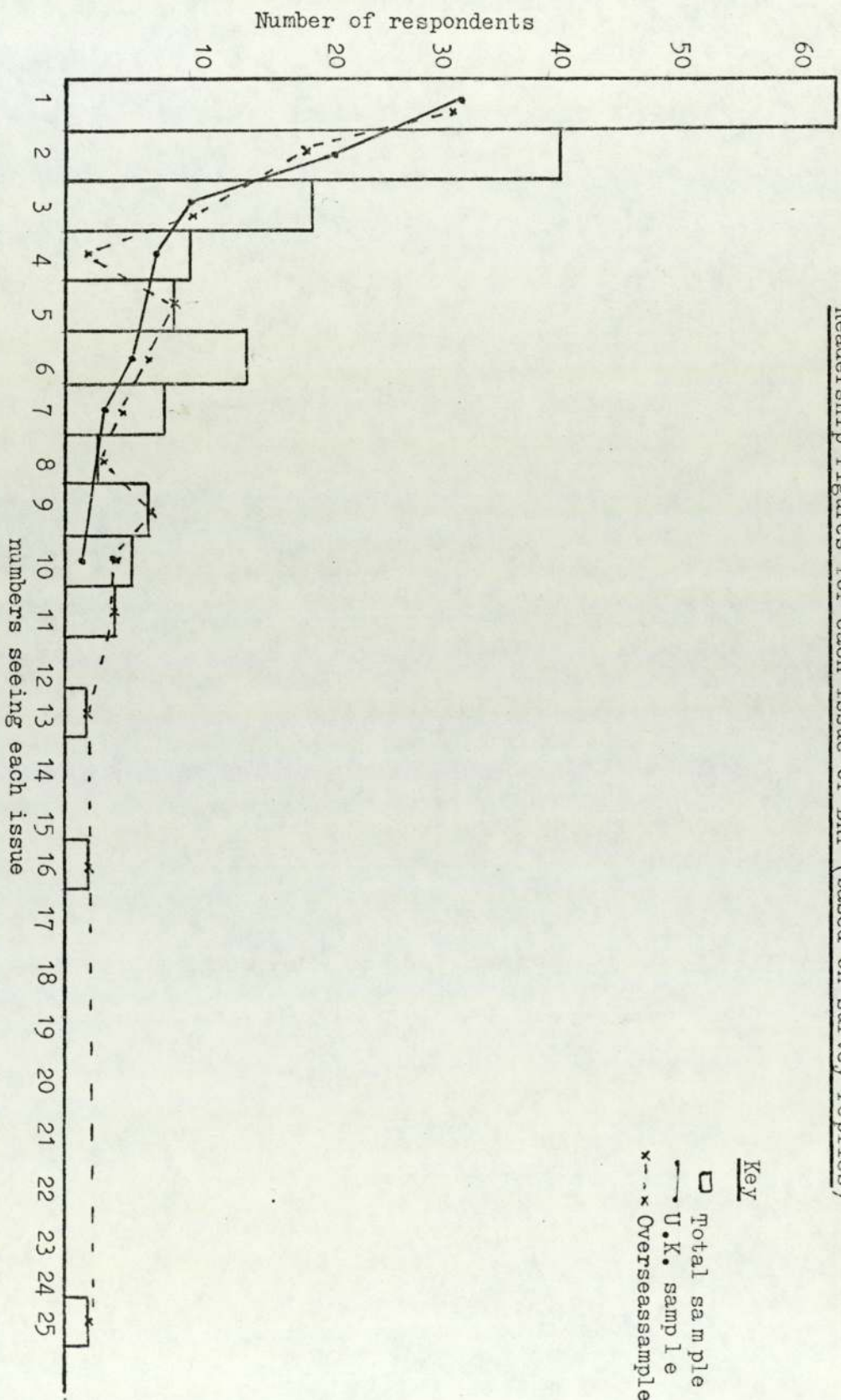


Figure 24
Readership figures for each issue of BRT (based on survey replies)

Statistical analysis provides an estimate of the actual readership average for each issue of B.R.T., based on the sample average. The method used to arrive at this estimate, and a similar estimate for the average circulation of International Biodeterioration Bulletin included in the following chapter, is outlined in Appendix 3.

The analysis confirms that the journal is likely to be seen by many more people than just the recorded subscriber numbers and suggests that actual circulation figures are likely to lie between:

$$584 \times 1.7 = 992$$

and

$$584 \times 6.9 = 3445$$

with a 95% probability.

5.3.12. Other Information Obtained

Apart from the specific questions already considered, users were also given the opportunity to comment on any other aspect of B.R.T. such as its general coverage, time lag, price, frequency and general appearance. Considering that answers were solicited in the questionnaire, very few replies were obtained.

3.2% (6 respondents) criticised the time lag between a reference's publication and its appearance in B.R.T. However, the low number of users criticising this time lag is a little surprising as the B.I.C. uses a number of abstract journals and Current Contents to obtain relevant items: in many instances, there is a two stage delay before a reference is cited

in B.R.T.

Perhaps a clue to this low level of dissatisfaction is in a general comment made by a number of respondents concerning both the coverage and time lag of B.R.T. The comment made was that B.R.T. was particularly useful in citing the occasional reference which was not noted by other services and which was usually a report from a particular organisation or working group. This suggests that some users are willing to accept the time lag and duplication of certain references in exchange for the extensive coverage by B.R.T.: certainly, many abstracting services do not cover the range of publication forms included in B.R.T.

Few comments were obtained on the general layout and appearance of B.R.T.: three respondents suggested that the entries were too close to each other, one user suggested that entries should be arranged from left to right across the page rather than in columns downwards and six users complimented the journal layout, remarking that it was easy on the eye.

Finally, in this section, all respondents were asked whether they would consider changing to microfiche copies of B.R.T. - in 1975 B.R.T. was made available in microfiche form as an alternative to hard copy. 90% showed no interest in microfiche and 10% felt that they might obtain B.R.T. on microfiche.

5.3.13. Costs and Subscriptions

A final question covered the subscription to B.R.T. and 94% of respondents appeared satisfied with the price: at the time of the study, a combined subscription to the B.I.C.'s two major journals cost £15 per year thus B.R.T. in effect was £7.50 6% of the responding sample felt that they would have to re-

consider their subscription and interestingly this percentage is close to actual cancellation figures in 1974 and 1975; in 1974 7% of subscribers cancelled their subscription and in 1975 this figure rose to 8.2%. However, the difference between total cancellations and total new subscriptions in each of the two years was very small and actually produced an increase in subscriptions of 1.6% in 1974 and 1.1% in 1975.

The above comments place the measurement of the use patterns of B.R.T. into a wider context: although scanning patterns vary from nil to the scanning of a few sections, and although only a few references are obtained per issue, it appears that most users still feel that the performance of B.R.T. is worth the subscription.

The comments also suggest that there is little likelihood of a wholesale cancellation of subscriptions in the near future and that subscriptions will remain relatively stable.

Libraries offer a significant market for journal sales and, despite the present period of economic stringency and cut backs, only two libraries felt that the subscription might cease. The views expressed by a number of librarians suggest that there is a price limit of between £30 and £50 and journals below this price are generally safe from cancellations.

Another point that emerged from the interviews with librarians was that few had carried out any reviews or monitoring processes on the usefulness of their library stocks, mainly because of lack of resources and were in a difficult position to compare the merits and price of B.R.T.

Finally, it is worth relating the favourable comments made on the price of B.R.T. to the costs of producing B.R.T., for although exact cost figures are not available, it is

apparent that considerable staff time is spent in preparing the journal and that it is the most time consuming of all the B.I.C.'s information activities. The responses indicate that future price increases would be acceptable provided that they were not excessive and linked to rising costs.

There is also the point that many users, including Biodeterioration Society Members and Reduced Rate Subscribers obtain the journal at preferential prices which are much lower than the production costs. Therefore, it may be time for the B.I.C. to reconsider its charging policies and bring charges for these users more into line with other subscribers.

5.4. CONCLUSIONS

B.R.T. is the "bread and butter" service of the B.I.C.: it appears regularly as evidence of the centre's activities; it maintains a regular group of B.I.C. users and provides a regular source of income; it generates some demand for the other B.I.C. services; and it provides a unique opportunity for all references on biodeterioration to be collected in one place. The above points need to be remembered when interpreting the results outlined in the previous sections and, in particular, the two results which relate to the general scanning patterns of B.R.T.:

Firstly, 75.5% of respondents scanned B.R.T. on arrival but less than half scanned it throughout. The remaining 24.5% did not scan B.R.T. at all for current awareness purposes. Secondly, 70% of respondents generally obtained five or less references per issue and no respondent obtained over forty references per issue.

Therefore, there appears to be a relatively low level of use of B.R.T. although the situation is complicated by the fact that no information could be obtained on the practical usefulness of individual documents obtained by individual respondents.

However, some of the other points brought out in the survey suggest that the low scanning patterns are acceptable to most users.

Firstly, B.R.T. is a current awareness service serving a variety of users and is not a service, such as S.D.I., tailored to the needs of individual users: as a result, most users are likely to find many of the references cited of no use or inappropriate to their needs and, perhaps more importantly, are unlikely to find the existence of these unsuitable

references an aggravation, provided that they also obtain some useful references.

The above point is reflected in the comments made about the price of B.R.T.: most users were satisfied that the price was reasonable despite the fact that they found less than 1% of the references per issue of potential relevance. 86.8% of respondents also scanned at least one other bibliographic service and the most popular services noted were Current Contents and Chemical Abstracts. As the former service is a major source of input to B.R.T. there is likely to be duplication although a number of users also highlighted the unique value of B.R.T.: it covers material, such as working party reports, preprints and trade literature, not included in other services.

Other points which increase the usefulness of B.R.T. relate to its multiple use for retrospective searching and by more than one person. Only 38% of respondents had actually carried out retrospective searches but when the circulation patterns of B.R.T. were examined it soon became apparent that many people besides the person identified on the mailing list were seeing the journal and that obviously increases the journal's use. An average of 3.4 persons saw each issue and statistical analysis suggests that actual user numbers will be between 992 and 3445.

Two other specific points are worthy of mention: Firstly, most respondents did not find the absence of abstracts or the lack of indices a particular hindrance: 67.5% were unwilling to pay more for abstracts and 68% were satisfied with the absence of indices although a number of users suggested that the title annotations and cross-references could be used

more consistently.

Secondly, little use is made of the photocopying service at the B.I.C. to obtain relevant references largely because other sources, notably the British Library in the U.K. are used.

Coupled with the specific results already mentioned, the general conclusion that emerges is that use patterns vary very little between different geographical areas. Therefore, the general hypothesis, that use patterns of the B.I.C.'s information services do vary between geographical areas has not been proven, as far as B.R.T. is concerned.

The above survey results offer some guidance on the future development of B.R.T. and, to conclude this chapter, some of these practical implications are considered. Firstly, there is general justification for the continued publication of B.R.T.: this is evident from the use patterns survey and is confirmed by the consideration of future subscription trends which suggest that subscriber numbers will remain relatively stable.

Secondly, it appears that there is little that can be done to the format or content of B.R.T. which will improve or increase the usage amongst subscribers and, in particular, there appears to be no justification for devoting resources to establishing entries with abstracts or indices.

However, the scanning patterns suggest that some thought should be given to the idea of sub-dividing B.R.T. and tailoring it more to the needs of individual subject groups: certain subject sections in B.R.T., notably the timber sections, appear to be scanned more than others and, with a significant group of users, they are the only sections

scanned. This suggests that the production of 'mini' B.R.T.s based on fewer subject sections might be more acceptable to certain user groups although the economics of such a procedure would need to be looked at carefully.

Thirdly, the low number of requests to the B.I.C. for documents cited in B.R.T. sheds some doubt on the wisdom of maintaining a comprehensive document collection. The problem is that the collection is not only used to support B.R.T. but also used for other external information activities and to support some teaching and research work within the university. The usefulness of the collection will be returned to in the following chapters but at this stage three points can be made relating to B.R.T.: the collection is used very little as a back-up service; any estimate of journal use based on photocopying requests will underestimate this use; and, on the production side, the collection of documents does mean that virtually all references will have been seen and evaluated before inclusion in B.R.T.

The final point is important as the evaluation function should be a major aspect of S.I.C. work. Perhaps the provisional conclusion, at this stage, given the need for economics, would be to suggest that the B.I.C. could cut down on its intake of some journals which are easily available elsewhere but that it should always collect material that is difficult to obtain from other information sources: the ability of B.R.T. to cite material not covered elsewhere was a quality noted by a number of survey respondents.

Fourthly, there are practical indications from the survey relating to the price of B.R.T. Generally, users are happy with the price and the evidence suggests that in previous years the journal may have been underpriced. At the time

of the study, this situation is being improved with the introduction of a regular price reviewing process and regular price increases to cover rises in production costs. Users' comments would suggest that such increases are unlikely to seriously affect subscriber numbers. However, the position of certain user groups is less rational with Biodeterioration Society Members and Sustaining Associates obtaining significant reductions on the standard journal price. In the early stages of a service's development such reductions are acceptable in order to maintain user numbers, but perhaps it is now time to reconsider these reductions. Journals are being sold at prices well below production costs and the B.I.C. is obtaining little benefit in return.

All the above comments stem from the results of the study of the specific use patterns of B.R.T. but this chapter concludes by emphasising that B.R.T. is only one of a number of information services offered by the B.I.C. and only part of the overall activities of B.I.C. The above results must be placed in their proper context and to do this requires similar studies of the other B.I.C. services. These studies are reported in the following chapters where many of the issues referred to already will be considered again.

Chapter 6Use Patterns of the Centre's Services - II International
Biodeterioration Bulletin

- 6.1 Introduction
- 6.2 Methodology
- 6.3 Use Patterns
 - 6.3.1 Scanning patterns
 - 6.3.2 Articles read
 - 6.3.3 Circulation
 - 6.3.4 Other comments
- 6.4 Costs and subscriptions
- 6.5 Conclusions

6.1. INTRODUCTION

The International Biodeterioration Bulletin (I.B.B.) is the primary scientific journal produced by the B.I.C. and, as Chapter 4 has noted, it began in a relatively informal way in 1965, being cyclostyled in the Biology Department at Aston University and available free of charge, but has developed into a formally produced journal which is international in scope and which includes refereed contributed papers as its main element.

A consideration of the use made of I.B.B. should provide relevant information in two ways:

primarily the study should provide specific information on the role and usefulness of I.B.B. within the specific operations and activities of B.I.C., but it should also produce some information of relevance to the wider questions concerning the role and usefulness of primary journals generally.

Regarding this latter point, the British Library is currently supporting a programme of research into primary publication (British Library 1975) and, recently, the Primary Communications Research Centre has been established at Leicester University initially to carry out three inter-related surveys whose aims are to review the trends in primary publication methods and costs. (British Library 1975).

The problems of journal publishing have been well documented in recent years and arguments range from the belief that the system of scientific journal publishing is, in itself, moribund to the less extreme view that there

are certain weaknesses in the system which make it less than effective. The former view is presented by Senders (1977) who suggest that increasing costs, printing delays and increasing difficulties in identifying and retrieving scientific information will lead to "the demise of the printed scientific journal and its replacement by a wholly electronically operated system". The latter view is represented in discussions over the usefulness of the refereeing system, the problems of delays before an article gets into print, the concept of 'core journals' and the argument that most of the world's published science which is of value is to be found in a comparatively small number of journals.

The evidence which suggests that 'core journals' exist and the increasing concern over the growth of specialised journals, coupled with the concerns regarding duplication of effort and costs, are particularly pertinent to I.B.B.: I.B.B. is a specialist journal and its production costs are relatively high so what was the rationale behind its establishment? A number of points offer some justification for the establishment of I.B.B. Firstly, I.B.B. is the only international journal concerned specifically with biodeterioration (Material und Organismen contains articles relevant to biodeterioration but it covers a wider subject field and contains mainly European contributions) and is, therefore, a significant mechanism for improving communication with the subject:

In 1972 the B.I.C. noted over 1000 journals carrying articles covering biodeterioration but the creation of one biodeterioration primary journal, as a

companion to a biodeterioration current awareness service, should, go some way to reducing duplication, reducing the effort in information collection, and to developing a unified information system within the subject.

Secondly, the availability of working scientists at the B.I.C. and their involvement with the scientific community offers a sensible environment for the production of a primary journal. The B.I.C., through I.B.B., can directly influence the growth of the subject and the university, through the B.I.C., is able to take an active part in the publishing and dissemination of original work.

Thirdly, the publication of a primary journal corresponds to the type of activity that specialised information centres were intended to carry out. Harvey (1976) states "surprisingly few specialised information centres publish primary journals" "However much the publication of even more journals is to be deplored, it would surely be more satisfactory for a centre, providing important services connected with research and development, to benefit from such a journal, if one is required, rather than for a commercial publishing firm to add to its list yet another title covering a very limited and specific subject field."

6.2. METHODOLOGY

Information on the use of I.B.B. was obtained from the same sample as that used for B.R.T. so information on the sample, given in the previous chapter on B.R.T., also applies to I.B.B. respondents: this information includes details on the response rate, the composition of responding institutions the qualifications of the respondents and the personnel within the respondent's institution and the library facilities available to respondents (see Chapter 5, Sections 5.1., 5.2., 5.3.).

I.B.B. acts as a vehicle for the publication of original work and, as a secondary function, provides information on current activities and general developments within bio-deterioration, through its conference page, the Biodeterioration Society newsletter, and a "Book Reviews" section. Therefore, the questions asked on I.B.B. use concentrate on the usefulness of the above functions and the effectiveness of I.B.B. in carrying them out. Figure 18 gives details of the questions asked which cover:-

1. the general pattern of use of the journal - i.e., scanning procedure, sections scanned, circulation.
2. the amount of material found useful - i.e., number of articles read per year and, with interviewees, subject of articles found useful.
- and 3. any other comments on the journal's coverage, status, design, layout and price.

In many ways, the quantification of the use of I.B.B. is more difficult than the quantification of use of B.R.T. For instance, B.R.T. is generally being scanned to discover

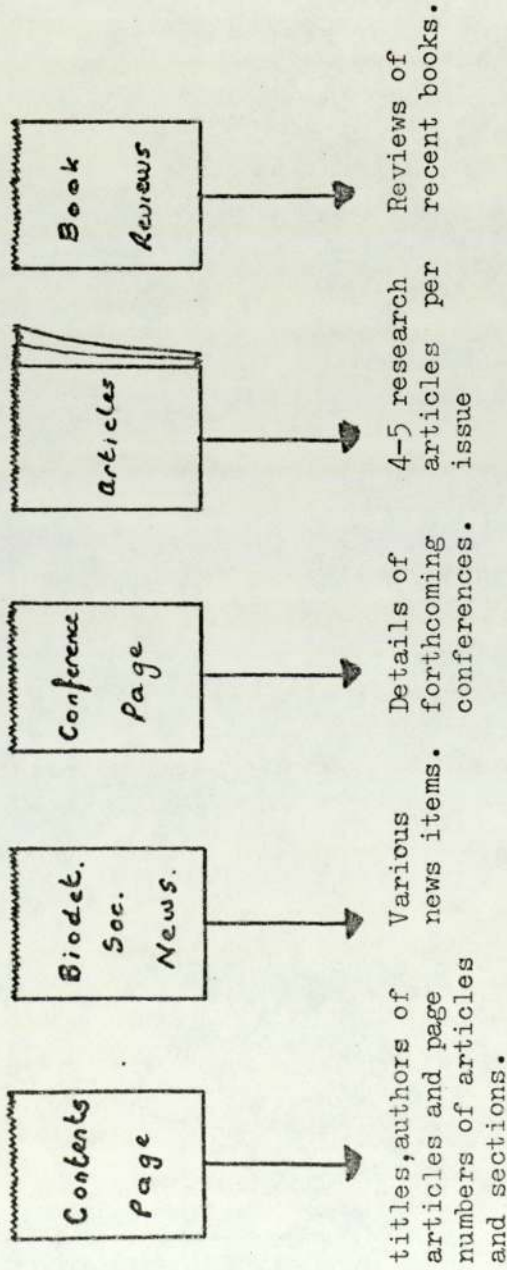
the existence of relevant references and, as a result, some figure can usually be put on the number of relevant references found per issue. Scanning of I.B.B., however, may not have such a definite purpose: it may be scanned for general interest, it may be scanned for a variety of purposes which may include looking for relevant work, checking the book reviews, and checking the Society newsletter for a news item or an advertised conference. So although some attempt has been made to quantify the results of the survey of I.B.B. use, a great deal of importance has also been attached to the general comments obtained from respondents on the role and usefulness of I.B.B.

Finally, there are two other features of I.B.B. which differentiate it from the other information services offered by the B.I.C. and which should be noted when considering the survey answers. Firstly, I.B.B. is obviously more research orientated than either B.R.T., which contains not only reports and articles relating to research but other references as well, or the enquiry service which deals with enquiries from researchers and practitioners. I.B.B. essentially includes articles detailing the results of original research so its use may be largely confined to other researchers, and not practitioners.

Secondly, unlike B.R.T., not only are respondents users of I.B.B., but many of them are also contributors or potential contributors to I.B.B.: views on its usefulness and value, therefore, may not only influence its use but may also influence the extent and nature of its input.

Figure 25

International Biodeterioration Bulletin - Sections per issue



Total pages per issue = @ 30-36

@ no. of pages per issue	1	2	1	25-30	2
	1	2	1	25-30	2

6.3. USE PATTERNS

6.3.1. Scanning Procedure

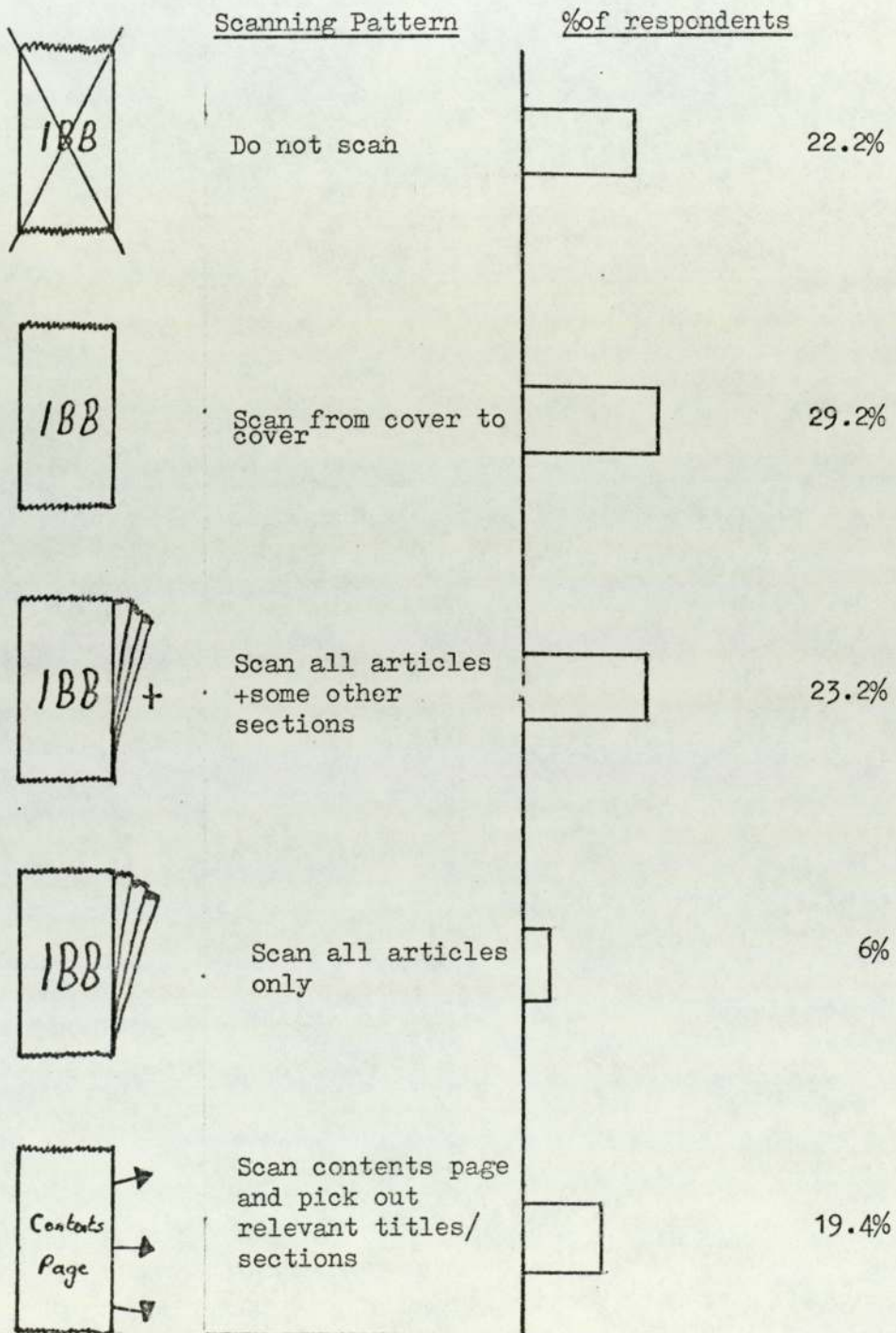
Set out in Figure 25 is the composition, section by section, of a typical issue of I.E.B.:

The first question aimed to discover whether all, none, or a selection of the above sections were regularly scanned by users. In this context, it is particularly important to ascertain whether any of these sections are being under-utilised in view of the cost of production of the journal. At this stage, the question only related to general scanning patterns and not to the actual relevance of items included in the bulletin - the latter aspect is considered in the following section - although even general scanning patterns can be difficult to quantify as users may not scan the journal systematically but rather browse in an irregular and unmeasurable way.

Despite the possibility of variations in scanning, however, all respondents were able to state their general scanning methods which ranged from cover-to-cover scanning to no scanning at all. General scanning patterns are described in Figure 26 which details the replies from the 185 respondents.

The five categories noted represent the major forms of regular scanning processes and, as with Eiodeterioration Research Titles, a notable percentage of users never look at the journal at all on arrival. In other words, a surprisingly high percentage of recipients, in this instance 22.2%, are subscribing to a journal without ever using it on a regular basis and, therefore, with little conception of its worth. 54% of the respondents in this category represent libraries where the issues are either displayed or filed (so the journal

Figure 26

IBB - General scanning patterns amongst respondents

TOTAL = 100%

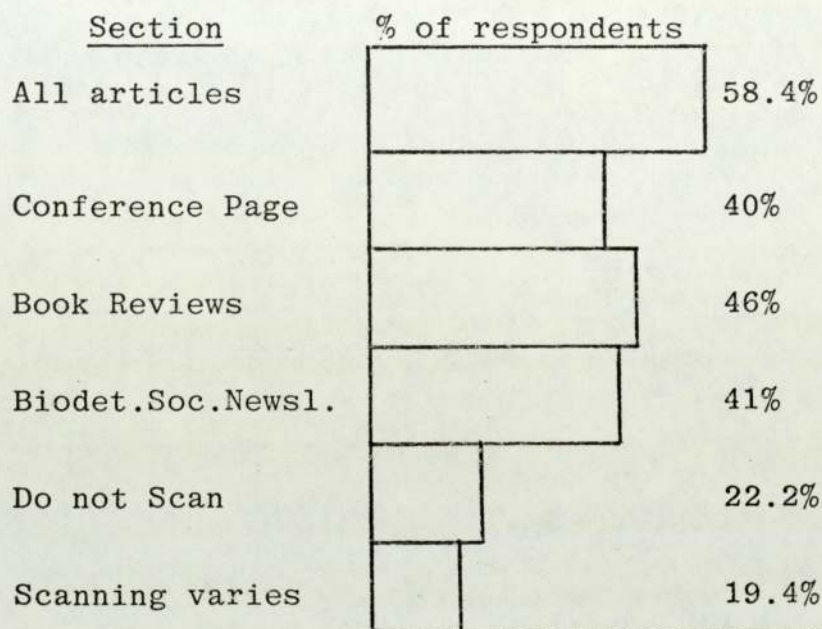
may be scanned by library users although no estimates of the extent of this use could be given) and the remaining respondents were individual subscribers.

The majority of users (those represented in categories 2 - 4 in Figure 26) carry out some form of general browsing in the journal, as might be expected with a journal of this type. 29% actually scan the journal from cover to cover, another 23% scan all the articles and certain other sections and 6% scan all the articles.

A relatively high percentage, 19.4%, use the journal in a much more specific way. That is, they do not browse but primarily only scan the contents page and then turn to any relevant sections or articles, noted in the Contents Page. The major arguments for this method of use is that it saves time, particularly important when a person has a selection of journals to scan, although it requires the article titles to be informative: the comments of respondents, reported in Section 6.3.4, show that most users are happy with the information content of I.E.B. titles

The information contained in Figure 26 can be redrawn to show the percentage of users scanning each section of I.E.B. per issue. These percentages are given in the following diagram:-

% of respondents scanning each section per issue (amongst 185 respondents).



The figures definitely show that 58.4% of respondents always scan each article per issue and that the conference page, book reviews and society newsletter are scanned by 40.5%, 46.5% and 41.0% of respondents per issue, respectively. Precise scanning patterns are unknown for the 19.4% of respondents who use the Contents Page every issue, as, generally, their scanning patterns will also vary with each issue depending on the relevance of individual articles in each issue. The majority of the 19.4% using the Contents Page, however, use it to find relevant articles and ignore the other sections of the journal. Therefore, the percentages in the above figure for conference page, book reviews, and society newsletter scanning are unlikely to be altered significantly by the inclusion of any figures for respondents using the Contents Page.

Scanning patterns for I.B.B. articles, on the other hand, are likely to be underestimated by the percentage in the above figure. Respondents using the Contents Page to locate relevant articles are likely to scan some articles from some issues therefore the percentage of 58.4% is likely to be increased, in each issue, up to a possible 77%. The percentages suggest that scanning of the articles is relatively high, although some of the other sections may be under-utilised.

The above figures, however, only refer to general scanning patterns so the following section attempts to look more closely at the items actually found relevant in each issue.

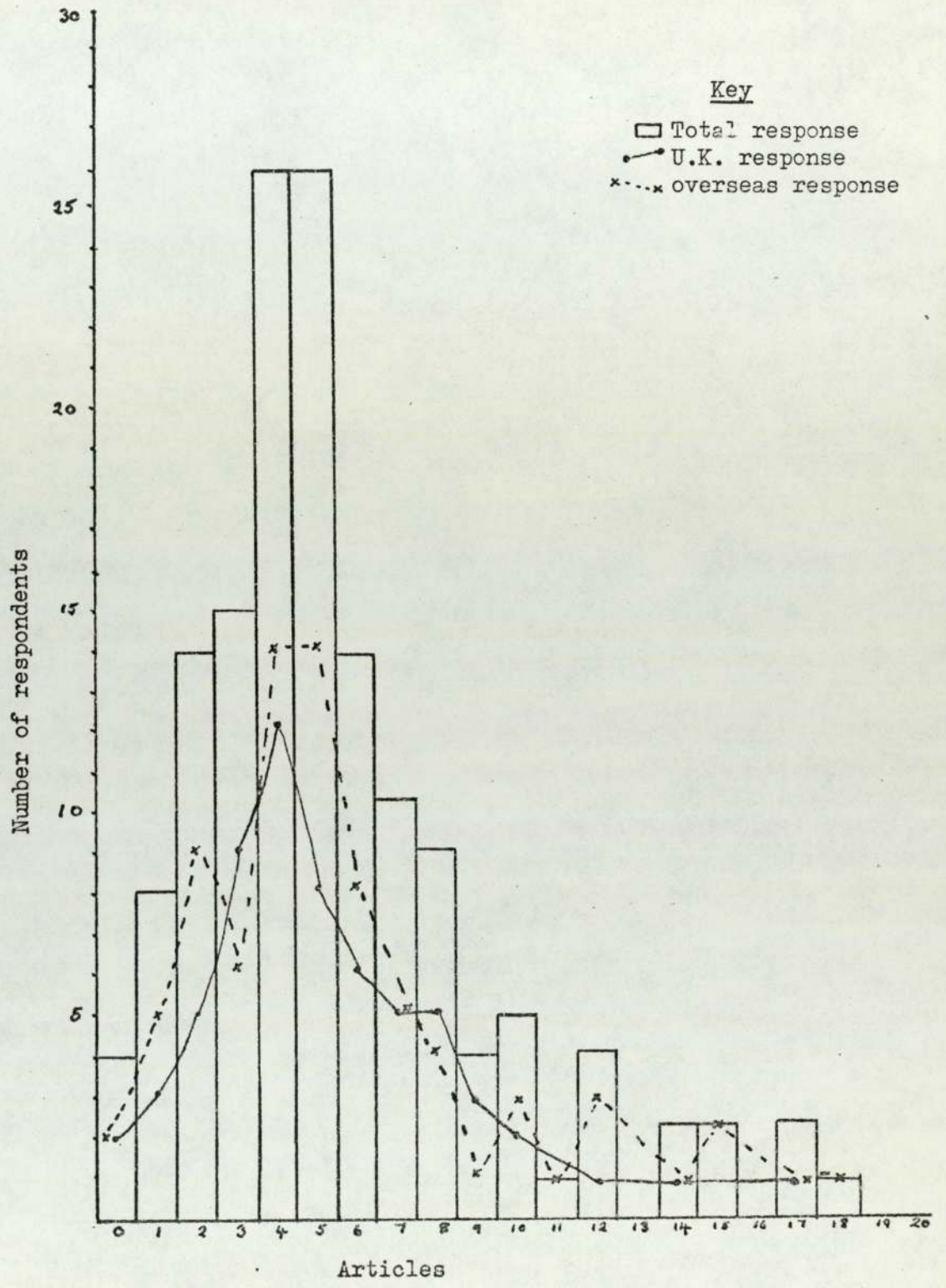
6.3.2. Articles Read

General scanning patterns can tell us how I.B.B. is used but they fail to tell us whether individual items or articles have been relevant or not, and, therefore, which items and articles have actually been read.

As the articles constitute the main element of the journal and as it would be difficult for respondents to remember individual pieces of information that were relevant in other sections, respondents were asked how many articles they had read over the previous twelve months. There were twenty articles in the relevant four issues of I.B.B. and details of the number of articles read are given in Figure 27. As the previous section showed, of the 185 respondents forty one did not scan the journal at all and the figures in the following graph are taken from the other 144 respondents who did scan I.B.B.

Figure 27

Number of articles read in IBB by respondents.
August 1974-August 1975



The graph shows a positive skewness reflecting the fact that most scanners have read less than half of the articles in the year's issues. The total average is 5.5 articles per reader and there is no significant difference between the U.K. and the overseas average. (U.K. average - 5.3, overseas - 5.6) Presentation of the above graphical information in a grouped tabulation, as below, summarises the actual readership of articles in I.B.B. by the 144 scanners in 1975:-

<u>Article No.</u> 1975	<u>No. of Respondents</u> (Scanners)	<u>% of Respondents</u> (Scanners)
0	4	2.8%
1 - 5	85	59.0%
6 - 10	42	29.1%
11 - 15	9	6.3%
16 - 20	4	2.7%
	<u>Total 144</u>	<u>100.0%</u>

The above figures show that over 60% of respondents read five or less articles in 1975 - a quarter or less of the total article content of I.B.B. This is still, however, an oversimplification as the above figures only tabulate the responses from I.B.B. scanners. If the sample is extended to include the non-scanners, referred to in Section 6.3., then the average number of articles read will fall and a higher percentage of respondents will read less than a $\frac{1}{4}$ of the articles in the 1975 issues. Non-scanners obviously will have not read any articles so the figures for nil readership given in the previous tabulation will be increased by forty-one, the number of non-scanners in the original sample of 185:

<u>Article No.</u> 1975	<u>No. of respondents</u> (Scanners and non-Scanners)	<u>% of Respondents</u> (Scanners and non-Scanners)
0	45	24.3%
1 - 5	85	46.0%
6 - 10	42	22.8%
11 - 15	9	4.8%
16 - 20	4	2.1%
	Total 185	

These figures, which include all sample respondents produce an average of 4.3 articles per respondent and increase to approximately 70% the number of respondents who read a $\frac{1}{2}$ or less of the total 1975 articles printed in I.B.B. Statistical analysis (calculation-Appendix 3) suggests that the true average for the total population is likely to lie between 2.75 articles and 6.72 articles per user with a 95% probability.

The above figures of readership are slightly higher than readership figures produced in other studies: respondents read, on average, 4.3 articles per year or 21% and a similar study by Kuney and Weisgerber (1970) of the Journal of Organic Chemistry suggested that the average reader utilised 17% of the articles presented to him. A general survey of scientists' reading habits by Meadows (1974) suggested that they read 10% of all articles presented to them. The previous figures, however, do not tell us whether some articles are read more than others. The ideal solution, to present a more realistic picture of I.B.B. use, would have been to ask all the 185 respondents which specific articles they had read during 1975. The problems of incorporating such a question in the postal questionnaire precluded the asking of this question of the 112 respondents who provided written replies but the question was asked of a small sub-sample made up of the fifty-six U.K. interviewees.

Regarding the readership of specific articles it is worth noting that the subject content of the 1975 articles was similar to the subject content in previous years, with articles on wood, plastics, polymers and grain being included more frequently than articles on other aspects, and that 1975 articles were typical examples of the range of aspects covered by I.B.B. and described in Chapter 3.

The small sample of U.K. interviewees chosen also includes a higher proportion of industrial firms than would have been the case if the total sample of 185 had been questioned and this may influence the type of article read: although in purely numerical terms, there is no significant difference between the number of articles read, on average, by respondents in the sub-sample (5.8 articles per respondent) and by respondents in the total sample (5.5 articles per respondent).

The percentage readerships of the twenty articles in the 1975 issue of I.B.B. based on the responses from the sub-sample of fifty-six U.K. interviewees, are given in Figure 28 .

There are limitations on the representativeness of such a relatively small sample, particularly in view of the fact that a number of the articles published during the study period, covering such topics as yam deterioration and grain deterioration are likely to have had more relevance to an international audience than a purely U.K. user group. Nevertheless, tentative observations can be made on the figures which show that no article was read by more than 40% of the sample and 90% of the articles were read by 30% or less of the sample

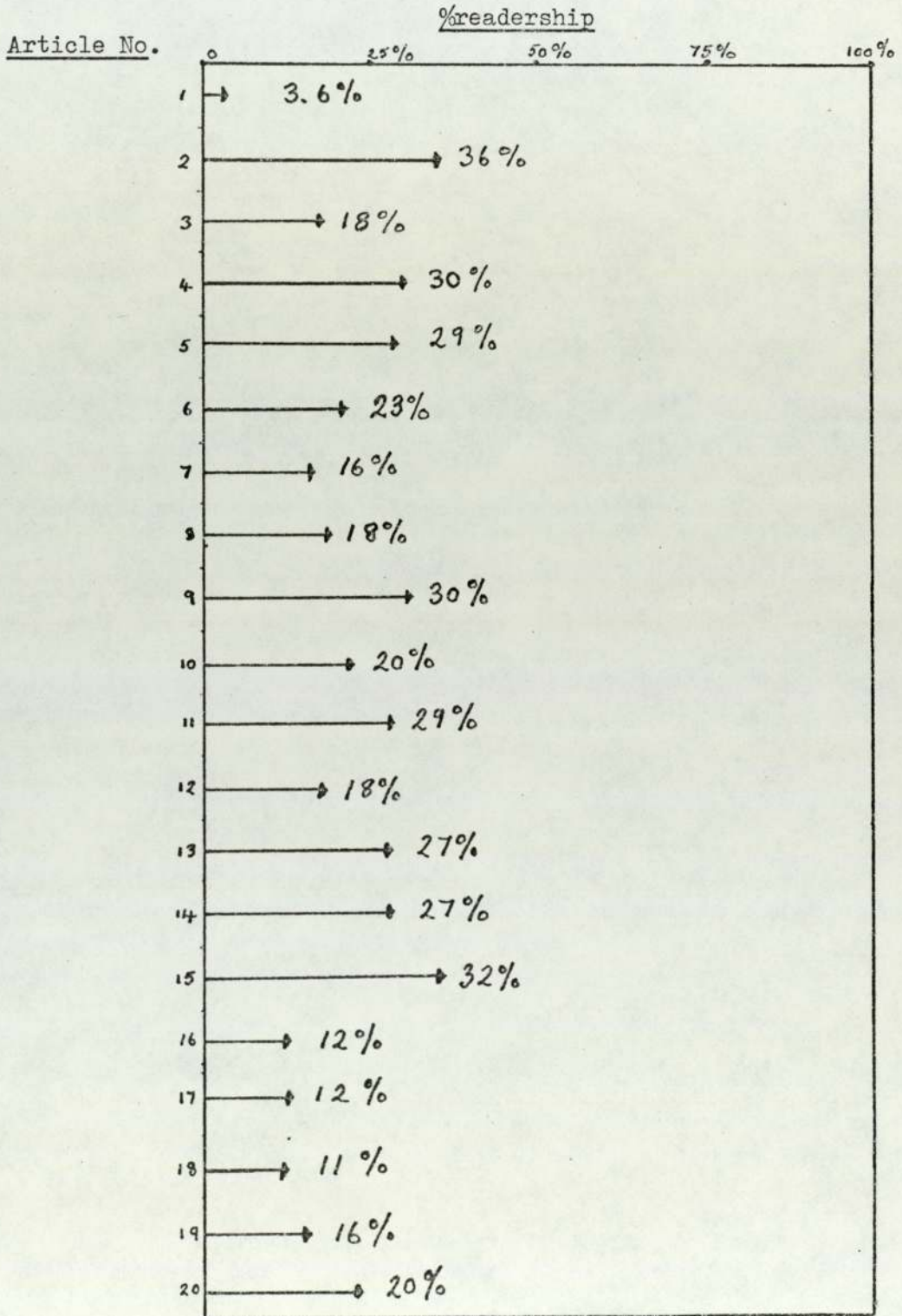
If the percentages of respondents reading each article are grouped together the following statements result:

0 articles were read by 0% of the respondents

1 article was read by 1% - 10% of the respondents

Figure 28

Percentage readership, among sample interviewees, of the 12 articles contained in IBB from August to August 1975.



10 articles	were read by	11% - 20%	of the respondents
7 articles	were read by	21% - 30%	" " "
2 articles	" " "	31% - 40%	" " "
0 articles	" " "	over 40%	of the respondents

The figures follow the general pattern of readership described in other studies of journal readership and generally produce slightly higher readership figures for individual articles than previous surveys. Using the figures detailed in Figure 5, for instance, then the average readership of an article in I.B.B. is 21% of the users: Kuney and Weisberger (1970) in their study stated that, on average, an article received only a 5% readership.

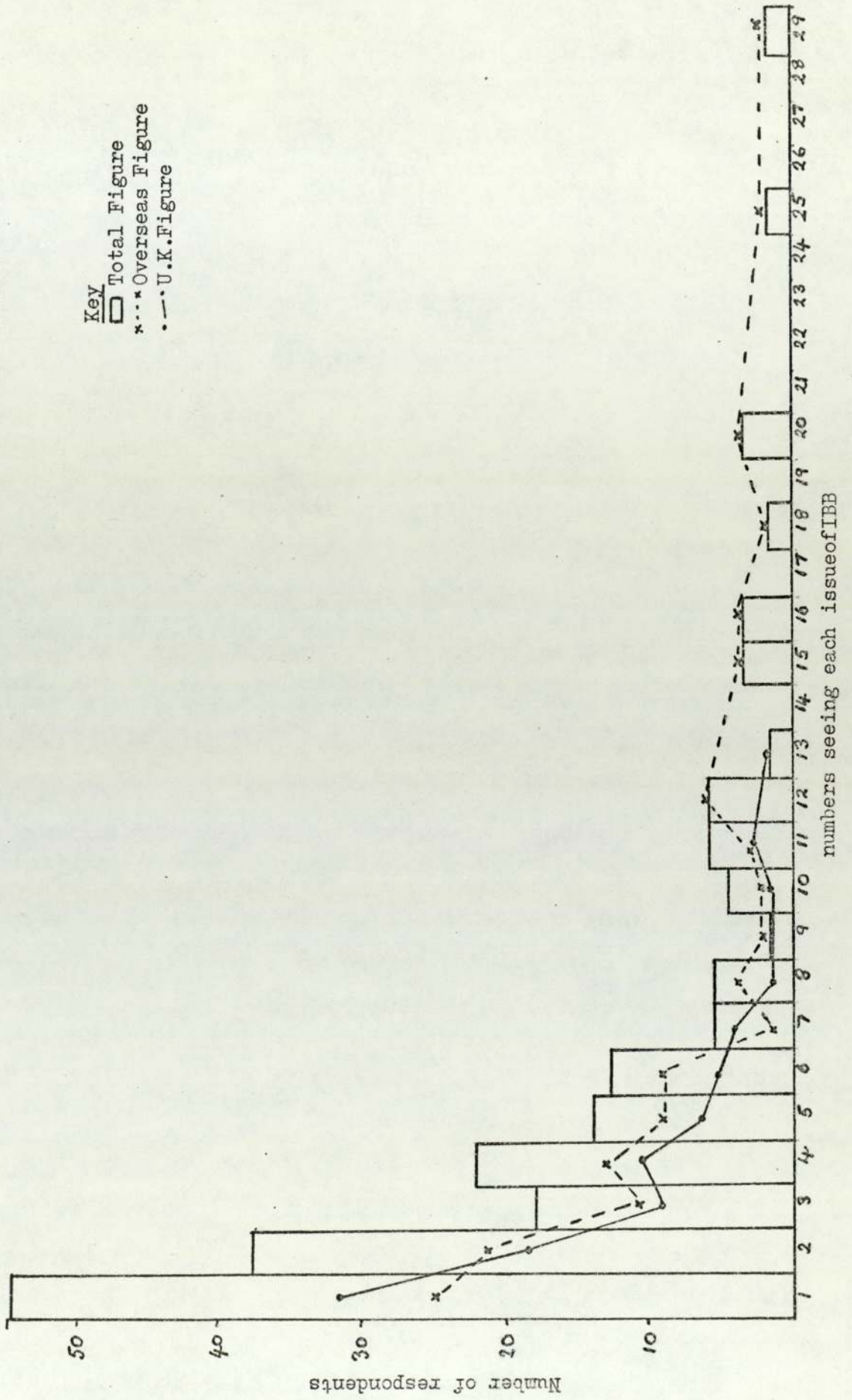
The majority of articles have also been read by over 10% of the users with only one article receiving less than a 10% readership. However, the study by Kuney and Weisberger (1970) showed that the majority of their articles studied - 75% - were read by 10.22% or less of the journal's audience. A study of the readership of articles in psychology journals produced even lower figures stating that only 2.5% of the articles in the survey had been read by more than 10% of the audience (American Psychological Association 1963).

6.3.3. Circulation

Recorded subscriber numbers for I.B.B. are 700 but this recorded number is unlikely to reflect the true readership numbers for the journal. Chapter 5 showed that B.R.T. was often circulated to two or more users in an organisation, producing an average 3.4 readers per issue, and the survey replies regarding I.B.B. suggest that circulation figures for this journal are even higher. The responses from the sample of 185 users are plotted on Figure 29.

Figure 29

Readership figures for each issue of IBB (based on replies from survey sample)



The first column of the graph, representing responses where only one person saw I.B.B., includes twenty-two of the non-scanners identified in Section 6.3. and these non-scanners are libraries where I.B.B. is displayed on the open shelves. Therefore, more than one person may well see issues of I.B.B. in these twenty-two instances but as no user figures were available these responses have been included in Column 1 of the graph.

Another twenty respondents stated that I.B.B. was seen by more than one person but they were unsure of the exact number seeing the journal. These responses have been included in Column 2 of the graph, representing responses where two people generally saw an issue: with some of these 'unsure' responses actual numbers seeing I.B.B. may well have been more than two people so, in this respect, the results will underestimate slightly total readership numbers.

Total responses produce a positively skewed graph with 50% of responses covered by the first two columns of the graph and 75% of responding institutions having circulation numbers between one and five persons.

There appears to be a greater variance in the overseas figures than in the U.K. figures with the former ranging from one to twenty nine persons and the latter ranging from one to thirteen. However, the existence of larger circulation groups in the overseas sample may well be a reflection of the larger sample overseas and there is no statistically significant difference between the overseas average and the U.K. average: in the U.K. the average circulation figure is three persons per issue and overseas the average is 4.9 persons per issue.

A combination of the two averages produces the total average for the 185 respondents which is a circulation of 4 persons per issue. Therefore, as with B.R.T. this implies that the actual readership of I.B.B. will be significantly greater than the recorded subscriber number of 700. Statistical analysis supports this view and infers that the true average for the total subscriber population is likely to lie between 2.4 persons and 6.4 persons, with a 95% probability. (Appendix 3). These statistics suggest that actual readership figures for I.B.B. are likely to be, at least, 2.4×700 or 1680 and may be as high as 6.4×700 or 4480, with a 95% probability.

6.3.4. Other Comments

The respondents in the survey were combined subscribers to the B.I.C. which meant that they received both B.R.T. and I.B.B. and at a reduced price: the price for each journal normally was £10 per annum but a combined subscription enabled the subscriber to obtain both journals for £15. In this respect, a number of respondents - approximately 16 out of the 185 respondents - stated that their initial intention was to subscribe to I.B.B. only but on realising that B.R.T. was also available at only a marginally higher cost they took this as well. It is interesting that a significant group of users should imply that I.B.B. is of more importance than B.R.T. in maintaining a current link with the subject since B.R.T. is the comprehensive current awareness service. It was also suggested by a number of users that, given a choice, they would rather forego seeing B.R.T. than I.B.B. which again reflects the relative importance of I.B.B. for certain users and perhaps the preference for articles to hand rather than

references. These comments are all the more interesting when it is noted that no comments of a similar nature were obtained relating to B.R.T. and that no one stated that they took I.B.B. after initially intending to subscribe to only B.R.T.

Another comment repeated by one or two users concerned the potential for I.B.B. to develop as a major international journal at the centre of the study of biodeterioration problems. Generally, respondents felt that the nature of the subject itself would make it difficult for I.B.B. to develop in the above way: the study of biodeterioration problems cuts across many disciplines, industries, sectors and countries and most of these areas will have their own group of journals to which workers in that area can submit articles on biodeterioration. This point is emphasised by Martyn (1974) who noted that 517 journal titles provided input to B.R.T. in 1973. Many of these journals will have been established longer than I.B.B. and may reach a larger or more coherent user group so it is conceivable that many new articles on biodeterioration will be submitted before or instead of I.B.B. This process will have obvious repercussions on the development of I.B.B. as a major primary journal.

A further aggravation to one or two respondents was that articles in I.B.B. were abstracted in only one or two of the major alerting services: this reduces the capability of an author to reach a large audience and may be another factor working against the choice of I.B.B. as the journal for a particular article.

Twenty respondents had comments to make on the presentation and layout of I.B.B. A frequent comment concerned the apparent waste of space in certain issues exemplified by graphs and diagrams covering a full page when they could have been

accommodated in less space and by the occurrence of blank pages after some articles. These wasted areas have been reduced in recent issues and, hopefully, this attention to economics in the layout and arrangement of I.B.B. will continue.

Finally, there was general agreement that the titles in I.B.B. were particularly informative and that the abstracts were reasonably good and, as with B.R.T., only a handful of users stated that they would be interested in microfiche copies of I.B.B.

6.4 COSTS AND SUBSCRIPTIONS

The cost of producing primary journals is relatively high but it is appropriate that I.B.B. should be produced at the B.I.C. where research in biodeterioration is being carried out. The publication of I.B.B. is also likely to enhance the reputation of the B.I.C. in the scientific community.

The importance of the B.I.C. contract research service must also be emphasised since it can subsidise the other information activities: I.B.B. and the other B.I.C. publications may be able to attract users to the contract research service but it is likely that the research service's income will be used increasingly to support the other information services.

However, with escalating printing costs it is imperative that every effort is made to look for economics in the production of I.B.B. and to offset as much of the increased printing costs as is possible by increased user charges. Regarding the reduction in printing costs, it would be a pity to lose the high quality in production that has been established but it may be worth considering a smaller size for I.B.B. or a smaller typeface or a more economical arrangement of the contents so that page numbers could be reduced. Publication of I.B.B. three times a year or even twice a year might also be worth considering, although this might reduce the current awareness of the journal.

The use of the university's own printing facilities would also reduce costs although at the time of the study the university's resources were unable to cope with the size

and timing of the requirements of I.B.B.: the situation may change in the future so the use of the university's facilities needs to be continually kept in mind.

In recent years, the B.I.C. has attempted to keep user charges in line with production costs, as far as possible, although with I.B.B. similar increases in user charges, to cost increases are not always practicable: between December 1974 and December 1975 printing costs alone increased by 100% but to keep in line with this increase would have meant an increase of the basic subscription to I.B.B. from £10 per year to £20 per year. This may well have priced I.B.B. out of the market for certain users and would have represented too great a price increase at one time.

Regular price increases for I.B.B. are now the norm, although, as with B.R.T., certain user groups obtain copies at relatively cheap rates: sustaining associates pay £50 per year which entitles them to twelve journals a year at a cost of only £4.16 per journal, while Biodeterioration Society members pay only £7.50 for I.B.B.

Reduced charges for certain user groups can be an advantage for a specialised information centre since it may attract users that otherwise would not have used the centre and thus increase income. However, sustaining associates to the B.I.C. have been decreasing steadily in recent years and the contribution to the I.B.B. budget from Biodeterioration Society members per year is very small. Perhaps in this period of the gradual rationalising of I.B.B. prices, the time is right to consider the usefulness of these reduced rates.

6.5 CONCLUSIONS

The publication of a primary journal is consistent with the aims of a specialised information centre: it can link subject specialists internationally, enhance the position of the specialised information centre within the subject and, usually fill a gap by providing a journal catering specifically for the specialist subject.

The publication of a primary journal is also consistent with the activities of a technological university and the existence of a group of subject specialists at that university. Universities are involved in the dissemination of research results to as wide an audience as possible and a scientific primary journal is one method of doing this.

However, despite the apparent intrinsic value of a primary journal publishing at a specialised information centre the high costs of producing such a journal is a major obstacle. Therefore, the investigation of the use patterns of I.B.B. was undertaken in the hope that it might offer some justification for I.B.B.'s continued publication. Unfortunately, it is apparent that the measurement of a primary journal's use is not particularly easy for a number of reasons. First, there are those who would suggest that a primary journal has little value as an information tool anyway because of the social system of science and, therefore, there is little point in examining its use: Meadows (1974) describes the archival nature of scientific literature suggesting that "it is designed to satisfy the urge to publish as much as the need for information".

Secondly, items such as the cover design and typeface may occasionally be more important in the selection of a

journal than its content. Thirdly, people use primary journals for different reasons, if at all: some are looking for specific items or articles, some are looking for general reading material and some are just browsing.

All the above things have complicated the survey of the use of I.B.B. but one or two basic conclusions are possible. It appears, for instance, that there is a large amount of printed paper produced which is never read or even scanned. 22% of users did not even scan I.B.B. at all and another 48.6% did not scan certain sections of I.B.B.

Figures relating to the readership numbers of articles in I.B.B. suggest that, on average, an article has a readership of 21% of users, and this figure is higher than readership figures in other surveys. The majority of users read approximately 21% of the articles contained in the year's issues so there is again the suggestion that large amounts of printed material remain unread.

The above figures may suggest that there is an argument for dividing the journal into smaller sections corresponding to certain subjects within biodeterioration. In practice, however, the division of a journal catering for a small specialised audience into even smaller sections would not appear to be economically feasible.

The low usage figures mentioned above are counter balanced, to some extent, by the circulation figures for I.B.B. which, like B.R.T., suggest that the actual number of people seeing I.B.B. is significantly greater than the recorded subscriber number of 700. The statistics suggest that actual circulation figures are likely to be at least 1680 and may be as high as 4480.

Furthermore, if the quantified results suggest that I.B.B. is not used particularly extensively then the subjective views of the respondents emphasise generally the usefulness of the journal and a number of respondents stated that I.B.B. was more useful than B.R.T. in keeping up to date with subject developments. This suggests a reasonably secure future for I.B.B. although with inflation still increasing production costs, the monitoring of the scope and production of I.B.B. remains a crucial activity.

I.B.B. is an attractively produced journal but it may be possible to make savings in the production of I.B.B. without detracting from its appearance. A smaller size, a smaller typeface, a reduction in the size of plates and graphs, and less issues per year may all offer significant reductions in cost.

It is perhaps also time to revise the charges for certain groups of users, such as Biodeterioration Society members and Sustaining Associates who receive I.B.B. at a very low subscription price. Low charges for certain user groups are important to a service with only a small potential market since they may attract users who would not otherwise use the service. Inflation, however, has overtaken some of the B.I.C.'s reduced rates so that they are now likely to be counter productive.

Finally, the editors of I.B.B. need to maintain interest in I.B.B. by including articles and other items of a high quality which satisfy stated demands. For instance, many users have requested more review articles and the editors of I.B.B. have tried to satisfy this demand, in one area, by establishing a series of reviews on fungal biological flora. The scope of I.B.B. could also be extended to

include more non-research articles, smaller contributions or notices, a letters page, and a directory page which could focus on various institutions involved in activities related to biodeterioration and which could provide descriptions of the work of these organisations. All these items might increase the potential market for I.B.B. beyond the research orientated user.

Chapter 7Use Patterns of the Centre's Services: III Enquiry
and Photocopying Services

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- 7.2 Methodology
- 7.3 Technical Enquiries received between
June 1966 and December 1971
- 7.4 Technical Enquiries received between
January 1972 and December 1973
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January 1974 and September 1976
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relationship with other services of the BIC
- 7.9 Conclusions.

7.1 Introduction

In addition to its regular publications the B.I.C. also offers a technical enquiry facility and a photocopying service and the document collection of the B.I.C. supports these additional services. The Studies reported here have attempted to investigate the extent and nature of the use of the enquiry and photocopying services, the resources employed in maintaining the services and the relationships of the services to other B.I.C. services and to the functions of a specialised information centre within a technological university.

Given the staff structure outlined in Figure 16 it should be noted that only one person is responsible for the organisation of the enquiry service while photocopy requests are dealt with by a clerical assistant. The enquiry service organiser may pass the enquiry to another individual where the enquiry corresponds with an individual's subject expertise and in this respect the enquiry service also has obvious links with the contract research services: some of the problems referred to initially in an enquiry may ultimately be answered by a laboratory test or a research project.

Both subscribers and non-subscribers to the B.I.C. publications can use the services and up to April 1975 subscribers were allowed two free enquiries per year. However, from April 1975 all enquiries involving a literature search have been liable to a charge.

Essentially the study has been concerned with evaluating the external use of the enquiry and photocopying services although there are two points that should be noted in this context particularly with reference to the enquiry service.

Firstly, although the majority of BIC users are located outside the university a number of enquiries are received from within the university and the document collection is also used to support the research and teaching functions associated with the BIC. Any observations on the usefulness of the enquiry service and the maintenance of a document collection, therefore, must take these other functions of the BIC into consideration.

Secondly, the existence of a group of subject experts within a university will in itself generate enquiries without the development of a formal information service. The questions are: What proportion of the enquiries would have been received at the university if only a group of researchers were located there rather than an information service and how many of the actual enquirers are unaware of the existence of a formal information service?

Both these points affect any consideration of the usefulness of the enquiry service and they will be referred to, where relevant, in the following sections where the study's results are described and analysed.

7.2 Methodology

From the inception of the BIC. up to 1976 there have been approximately 1,000 technical enquiries and 700 individual photocopy requests so it has been impossible to study every enquiry or request in detail.

With enquiries the study has concentrated on those received in 1974 and 1975: only the number and distribution of pre 1972 enquiries have been noted while for 1972 and 1973 enquiries some details have been obtained on the enquiry source within an institution, the subject distribution, the ability of non-subscribers to discover the BIC. and the income generated by the service. The above information obtained on 1972 and 1973 enquiries has been limited to the areas easily identifiable in the enquiry records and in this two year period details of 185 enquiries were recorded.

For 1974 and 1975 enquiries, however, it has been possible to decide on the information required and to design the methodology accordingly: all enquiries received between January 1974 and August 1975 have been monitored to discover the source, nature, and form of the enquiry, the procedure undertaken for answering the enquiry, and the value of the answer to the enquirer. This monitoring procedure has been adopted with 145 enquiries dealt with during this period and the major items of information obtained from it are given in Figure 30. The questionnaire completed by the enquiry answerer in Stage 2 of the monitoring process is detailed in Figure 31, and the questions asked to enquirers in Stage 3

are given in Figure 32 .

The study of photocopy requests has also concentrated on those received between January 1974 and August 1975 and has investigated the date and source of the request and the documents requested. During the period 137 requests, covering 700 individual items, were processed.

Figure 30
Monitoring Procedure used for 1974/1975 Enquiries

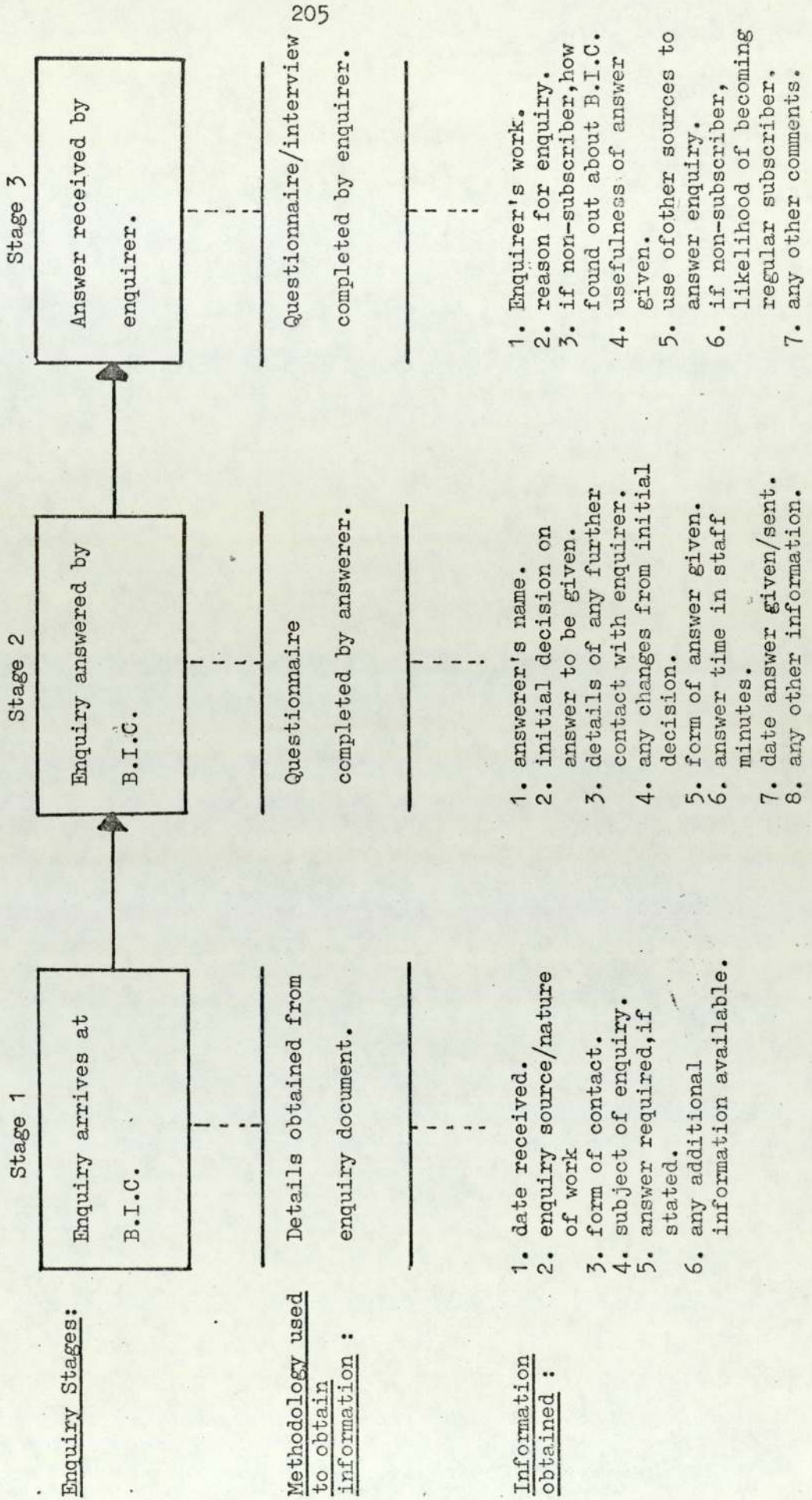


Figure 31Internal B.I.C. Questionnaire for Enquiry Answerers 1974/1975Questions

1. Answerer's name.
2. Answering Process:
 - a) Initial decision on how answer to be given?(i.e. bibliog., 'phone, letter, hard copies of key articles etc.).
 - b) Any further communication with enquirer during answering process?
 - c) Any changes from initial decision on answer to be given? (give changes and reason for changes -i.e. failure of first approach, communication with enquirer etc.)
 - d) Answer given? (i.e. bibliog., ' phone call, summaries of articles, hard copies of key articles, letter, referred elsewhere, no information found, any other answer given).
3. Answer Time - approximate time spent on answering enquiry? (in staff minutes).
4. How was the answer given? (i.e. post ,phone, personal contact, other method).
5. Any other information, comments?

Questions asked to 1974/1975 enquirers on receipt of enquiry answer

1. Name of respondent.
2. Work Institution and Department.
3. How did you find out about the B.I.C.'s services? ,i.e. individual outside your organisation,work colleague,internal library,other organisation,publication,advertising campaign,other sources (please specify).
4. What was the reason for your enquiry? Please tick any applicable statement below:
 - a) trying to solve a specific problem.
 - b) beginning a project,study,research etc.
 - c) already working in subject/related subject area but exploring new subject area.
 - d) other reason (please give further details if possible).
5. How far was the centre able to answer your enquiry? Please tick any applicable statement below:

If answer a) to question 4

- a) the B.I.C.'s answer solved problem(or showed that problem could not be solved).
- b) the B.I.C.'s answer increased the problem solving ability of the enquirer.
- c) the B.I.C.'s answer was of no use in solving the problem.

If answered b),c),d) to question 4

- a) the B.I.C.'s answer increased your knowledge of the subject.
 - b) the B.I.C.'s answer did not increase your knowledge of the subject.
6. Did you use any other services/sources to answer this enquiry? (If YES,give details if possible)
 7. Is there a library/information unit in your work institution?
 8. Are you likely to become a regular subscriber to the B.I.C.'s journals?
 9. If answer NO to question 8, please give reason (s) ,i.e. price, subject coverage,time lag,other sources used,presentation, other reason (s) (please specify)

Please feel free to make any other comments not covered by the above questions.

7.3 Technical Enquiries received between June 1965 and December 1971

As an introduction to the more detailed studies to follow Figure 33 gives the number of enquiries received annually from 1965 to 1975 with the changes in the services of the BIC. which may have affected enquiry numbers.

Considering the period between 1965 and 1971 a number of points are worthy of mention:-

Not surprisingly enquiry numbers grew from a small number in the early years of BIC. development to over 150 in 1969 and 1970.

This increase was gradual until the end of 1967 when the service was publicly advertised for the first time (Eggins 1969).

The bibliographic journal, IBBRIS, also appeared for the first time in 1967.

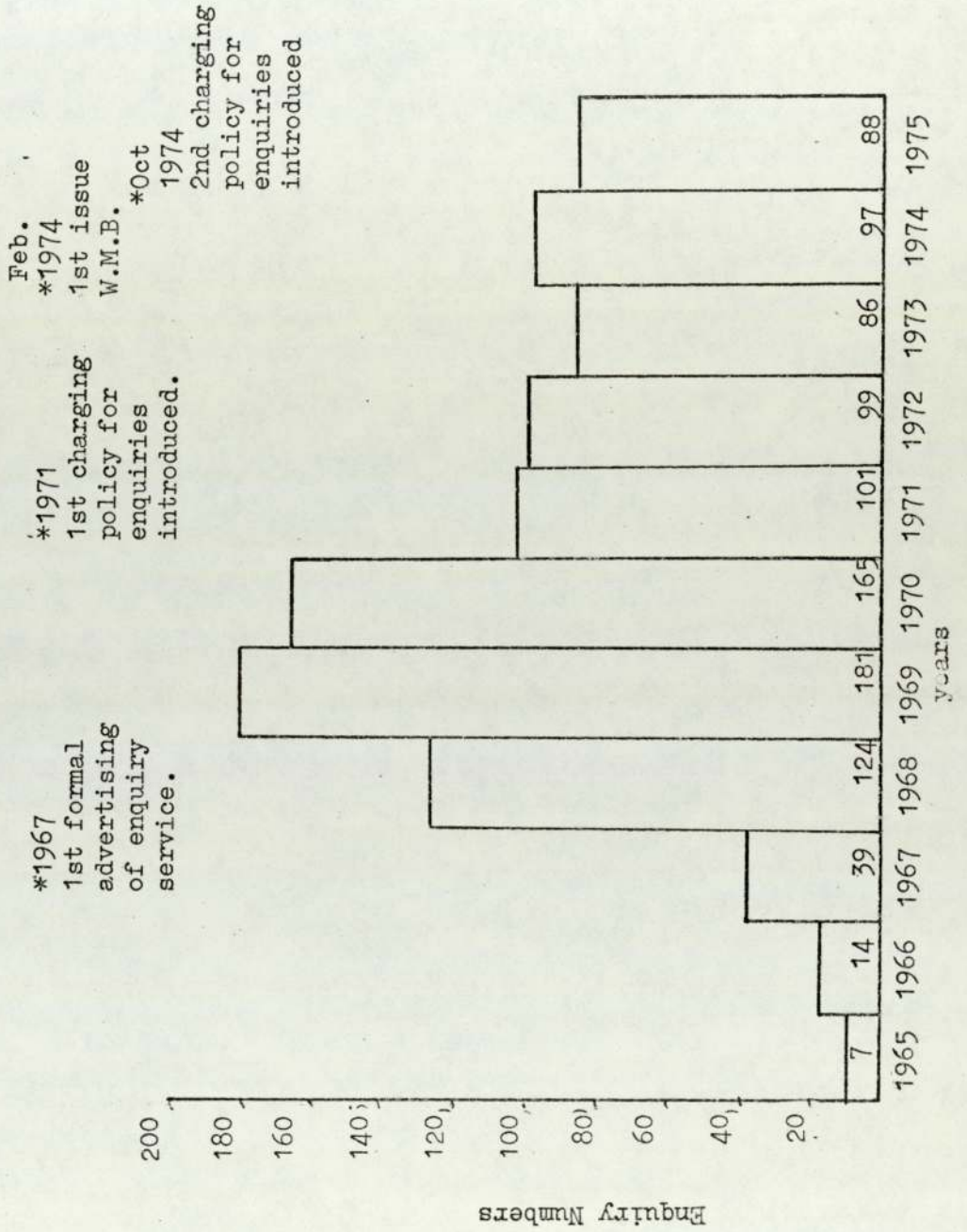
Both developments seem to have had a noticeable effect on enquiry numbers with over a trebling of enquiries taking place between June 1967 and December 1968.

There was also no charging policy operating on enquiries between 1965 and 1971 and from 1967 subscribers were actively encouraged to send in enquiries with the inclusion of a full page enquiry slip in IBBRIS.

In considering the enquiry figures it should be noted that the organisation and activities of the BIC. were significantly different before 1971 than after. As stated in

Figure 33

Technical Enquiry Numbers, 1965-1975



Section 4.3.3, during the earlier years of BIC. development the majority of staff were information specialists rather than subject experts, and resources were largely devoted to developing extensive indexes and retrieval systems. This suggests that in the pre 1971 period the BIC. was less flexible and that it was more difficult to offer any sort of information analysis function when answering enquiries. This analysis function developed later when biodeterioration research and contract work became an extensive part of BIC. activity.

The nature of the enquiries is also likely to have changed over the years with more enquiries of a general nature being received during the formative years of BIC. development when the problems of biodeterioration were not widely known: this point is referred to in the BIC. annual report for 1968 which states that documents were being indexed in too great a detail in view of the general nature of many enquiries received.

By the end of 1971, 631 enquiries had been processed with 83% originating in the UK and 17% from overseas. The overseas enquiries originated from thirty-two countries although the largest enquiry group came from the USA - 27% of the overseas total originated in the USA.

The 631 enquiries came from 538 institutions with sixty of these using the service more than once according to the figures below:-

<u>Number of Enquiries sent in by</u> <u>Institutions</u>	<u>Enquiry Numbers</u>
37 institutions put in 2 enquiries	74
16 " " " 3 "	48
5 " " " 4 "	20
1 institution " " 5 "	5
1 " " " 6 "	6
	<hr/> 153 <hr/>

Therefore, 15% of the 631 enquiries resulted from the repeat use of the enquiry service.

In 1971 a package deal was introduced by the BIC: by this deal, subscribers to the journals were allowed two free enquiries per year of not more than one hour's search time each with further enquiries charged at £5 per hour. Non subscribers were charged £5 for an hour's search (BIC 1970).

Figure 33 shows that the first noticeable fall in enquiries took place during 1971 although it is difficult to say how far the above charges contributed to this fall. Enquiries had begun to fall a year earlier when enquiries were still free and the further fall in 1971 may have simply reflected a natural levelling off process.

The integration of the enquiry service into an overall charging policy was, however, an initial step in the rationalisation of the information services which took place parti-

cularly from 1971 onwards and it should have provided some indications of the value of the enquiry service. These points are considered in the following section.

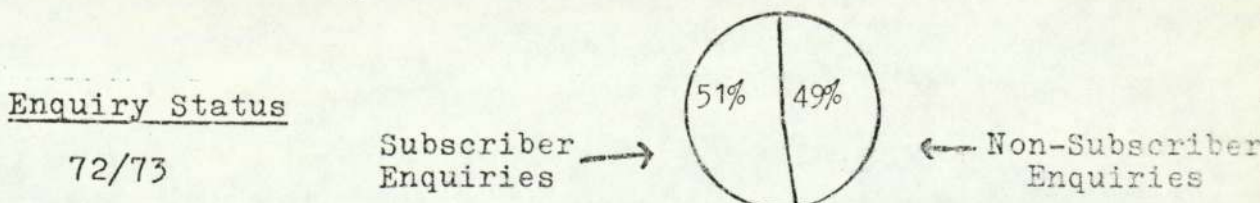
7.4 Technical Enquiries received between January 1972 and December 1973

7.4.1 Introduction

Although the description given in the previous section provides an historical perspective to the enquiry study the period during 1972 and 1973 is more indicative of the present role and function of the enquiry service for a number of reasons: it represented the first period of charging for enquiries, biodeterioration research had become an integral part of the BIC's activities and subject experts could answer enquiries, less attention than previously was paid to the detailed indexing of documents and many potential enquirers had accumulated back copies of BRT. for possible retrospective searching. The number of enquiries also began to stabilise around the 100 figure and has continued to do so up to 1976. Therefore, set out below are some simple results from the investigation of 1972 and 1973 enquiries which will form a basis for the more detailed study of 1974 and 1975 enquiries to follow.

7.4.2 Enquiry Numbers and Distribution

During 1972 and 1973 185 enquiries were sent to the BIC with an almost equal division between subscriber and non subscriber enquiries:-



Fifty one countries contributed enquiries although almost 75% of total enquiries originated in the UK.

Enquiry

Source

72/73

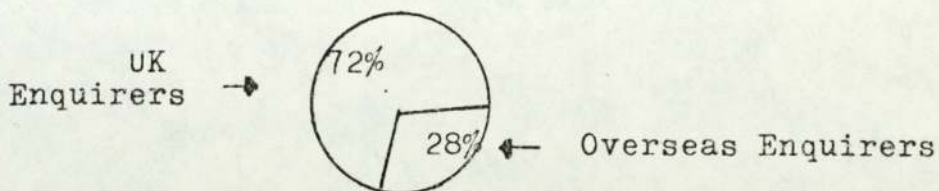


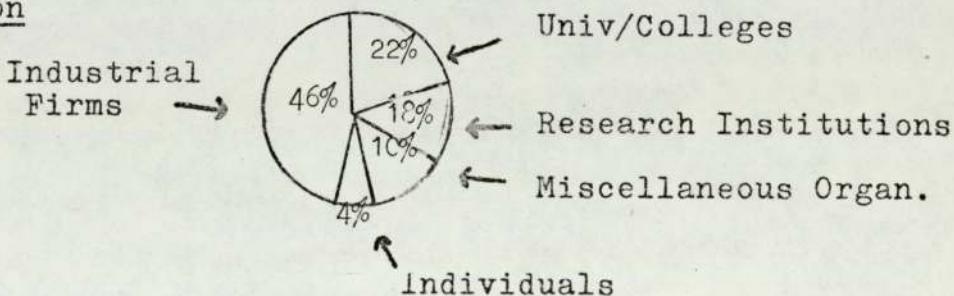
Figure 34 provides a detailed breakdown of the geographical source of the overseas enquiries.

Almost half of the enquiries came from industrial firms with other institutional sources being universities and colleges, research institutions and miscellaneous organisations:-

Institution

Source

72/73



Behind these overall figures, however, it is interesting to note that in the United Kingdom over half the enquiries came from industrial firms while overseas the distribution of enquiries amongst institutions is more equally divided:-

Institution Source 72/73

U.K.

OVERSEAS

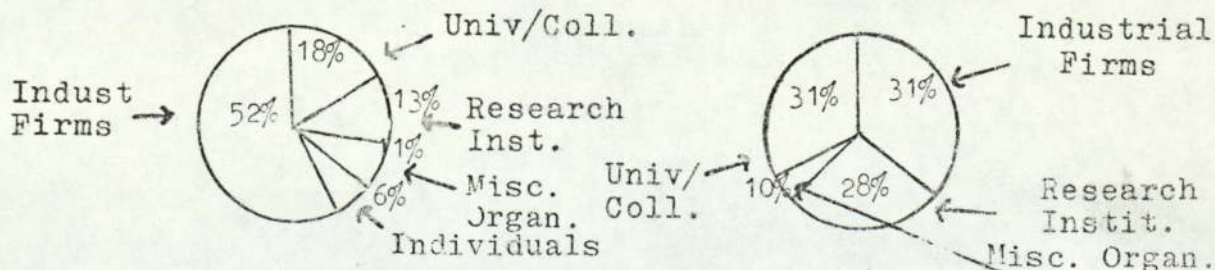
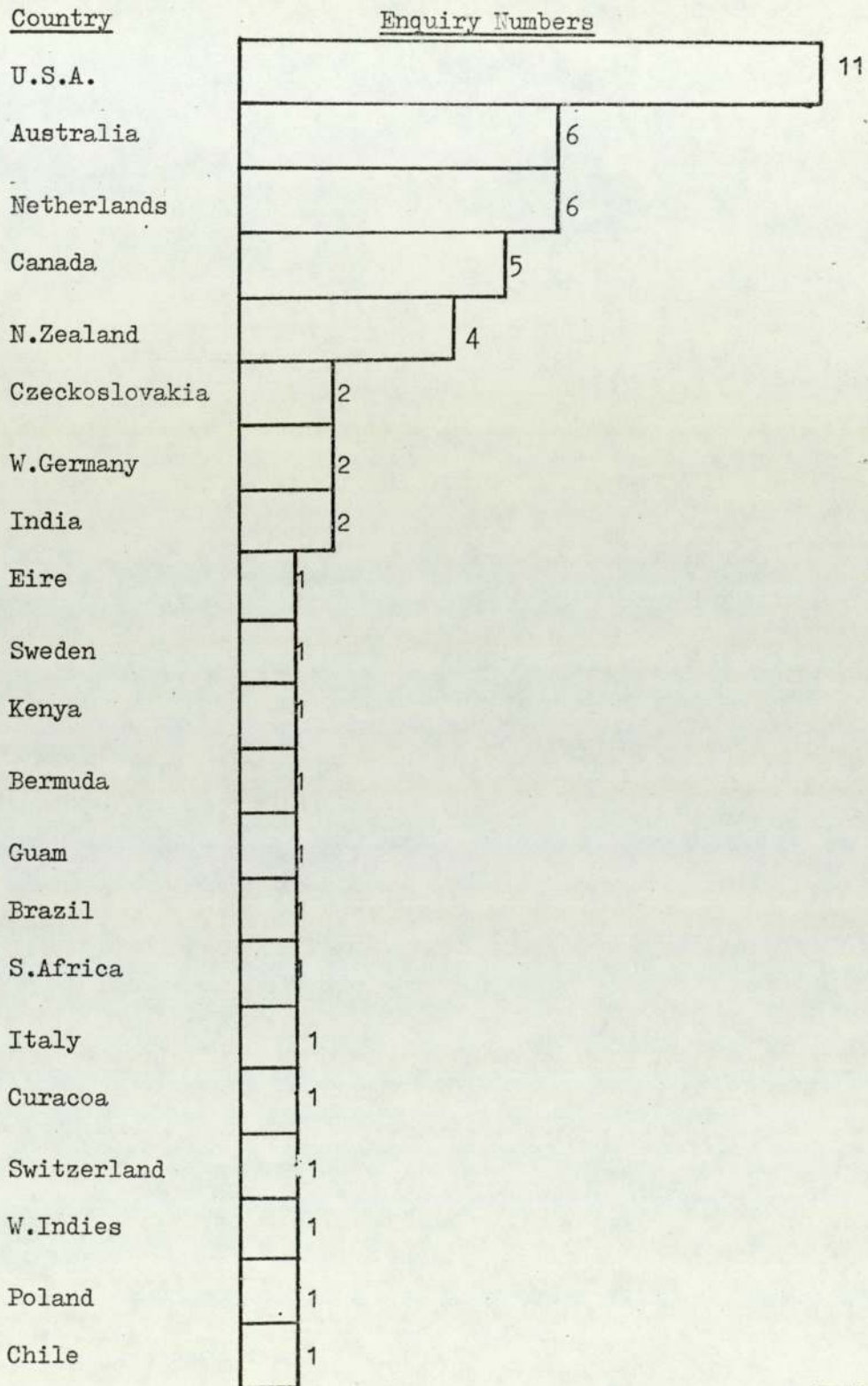


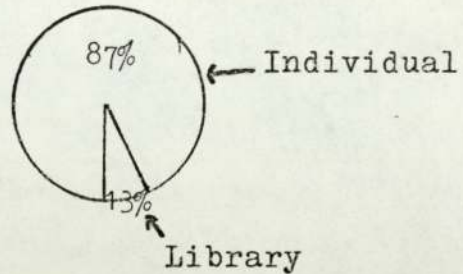
Figure 34

Geographical Source of Overseas Enquiries 1972-1973

 TOTAL OVERSEAS ENQUIRIES 51

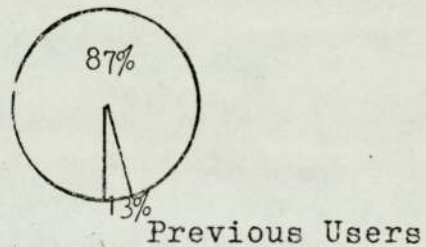
Within institutions the great majority of enquiries came from individuals rather than a formalised information service or library:

Source within
Institution
72/73



Finally, approximately 13% of enquirers had previously used the enquiry service before 1972:-

Previous
Use
72/73



The basic figures detailed above suggest that the enquiry service is an important advertisement and contact point for non-subscribers, as approximately 50% of enquiries are from non-subscribers, and that the proportion of subscribers likely to use the service in any given year is relatively small. As might be expected, the majority of enquiries originate in the UK and english speaking countries while a strong industrial base to the service is suggested by the figures representing the institution source.

7.4.3 Subscriber Enquiries

Apart from the above figures the records provide some

other interesting information. Regarding enquiries from subscribers, for instance, it appears that 37% were from sources within an institution different from the recorded subscriber source: 18% came from individuals where a library is recorded as the subscriber and the remaining 19% came from individuals who were not the subscribing individuals. These figures suggest that, in many instances, knowledge of the BIC's services may not be confined to the subscriber source and that it is likely that the numbers seeing the publications is larger than the number of recorded subscribers. The study of BRT, outlined in Chapter 5, confirms these suggestions.

7.4.4 Non-Subscriber Enquiries

Noticeably, the charging policy adopted in 1971 for non-subscriber enquiries was not extensively used during 1972 and 1973. Only 28% of non-subscribers were charged the price of a search, another 36% paid photocopying costs and the other 36% were not charged. The difficulties of pursuing a strict charging policy become evident when the organisation and staffing of the BIC is considered: the BIC has some obligation as part of a publicly supported body to provide information externally; a non-subscriber may become a regular subscriber; and in practice many of the enquiries could be answered by subject specialists without a literature search.

A second point worthy of some consideration, but largely unanswerable, at this stage, is the nature and characteristics of non-subscriber enquiries. Why should this particular group of non-subscribers contact the BIC?

Do they possess any common characteristics? Have others with biodeterioration problems failed to contact the BIC? What are the mechanisms by which non-subscribers find out about the BIC, and can these mechanisms be improved or influenced directly by the BIC?

These questions are examined in detail in the study of 1974/75 enquiries but the information that can be gleaned from the 1972/73 suggests that a large proportion of non-subscriber enquiries are referred to the BIC by individuals working in the biodeterioration field. This certainly appears to be true for UK enquiries although with overseas enquiries it is interesting to note that a particular group of enquiries resulted from an article published by a centre member on the conversion of newspaper into cattle feed. The article was published in a widely read journal, The Surveyor, and shows the ability of BIC staff to directly influence enquiry numbers. It is also highly probable that the majority of enquirers, when enquiring on this subject, were unaware of the existence of the BIC as a formal information source but were enquiring of the author of the article.

7.4.5 Subject Distribution

The ability of the BIC to influence directly enquiry generation, the influence of trends on enquiry subjects, and the general question of whether there are any subject concentrations of enquiries are all important as standard answers could be prepared to deal with similar questions and, possibly, future enquiries anticipated: this has been begun to some extent, with the development of specialised

bibliographies in popular subject areas.

Moreover, an analysis of the subject areas of enquiries provides another indication of the extent of interest in biodeterioration problems and presents some guidelines for the future development of services.

All subject areas where more than one enquiry was received during 1972/1973 are detailed in Figure 35 and the subject areas used are based on the RRT classification. Rubber and plastics, Foodstuffs, Fuels and Hydrocarbons, Textiles, Recycled Feedstuffs, and Waste Biodegradation are all subject areas with large enquiry numbers although the incidence of enquiries received of a similar nature, and able to be answered in the same way, is relatively low: the enquiries generated by the already mentioned 'Surveyor' article could be answered in the same way.

Similarly, the subject of "biodegradable plastics" was in vogue during this period and six enquiries were received all requiring general information on the subject. This topic had been extensively publicised in the scientific community and popular media and a measure of the interest generated in the subject were the enquiries received at the BIC.

Apart from these two examples similar enquiries are rare. The only other examples were two enquiries on cotton decay, two enquiries on the effects of oil when dispersed in the ocean and two enquiries looking for general papers on glass deterioration. Another interesting point regarding the subject distribution of enquiries is the relatively high

Figure 35Subject areas where 2 or more enquiries have been received, 1972-1975

<u>Subject</u>	<u>Enquiry Numbers</u>		<u>Total</u>	
	<u>1972/73</u>	<u>1974/75</u>		
Waste Materials				
Biodegradation	10	38	48	
Rubber/Plastics	26	16	42	
Foodstuffs	10	9	19	
*Methane Production	7	5	12	
Fuels, Hydrocarbons	9	3	12	
Timber	9	2	11	
Stone, Concrete	2	6	8	
Textiles	7	-	7	
+Toxicity Problems	3	3	6	
Leather	3	2	5	
Metals	4	-	4	
Glass/Lenses	4	-	4	
Cables	3	-	3	
Detergents	3	-	3	
Mycotoxins	-	3	3	
Cellulose	-	3	3	
Marine Fouling	2	-	2	
Bird Hazards	-	2	2	
Books	-	2	2	
	<u>TOTALS</u>	<u>101</u>	<u>95</u>	<u>196</u>

* All enquiries resulted from the publication of a particular article.

+ All enquiries from the same source

number of enquiries concerned with waste materials biodegradation at a time when the B.I.C. was establishing a strong research interest in this area and was also contemplating the creation of a journal on this topic which appeared in the following year.

As might be expected all the major enquiry subject groups covered particular substances and materials rather than particular organisms and a glance at the more popular subject areas shows that although the B.I.C. has produced a number of specialised bibliographies to cater for these areas, there are still subject areas, such as wood deterioration and preservation and textile deterioration, where similar exercises might be useful.

7.5 Technical Enquiries Received during 1974 and 1975

7.5.1 Introduction

The points raised so far have resulted from a study of B.I.C. records but in the major study of enquiries during 1974 and 1975 it has been possible to obtain more detailed information by monitoring the enquiry answering process and contacting the enquirer.

This is the first time that the enquiry process has been monitored and although in previous years enquiry records have been kept enquiries have been answered by various people in different ways and records kept and maintained by different people so, with a certain level of mislaid and unrecorded enquiries, the figures are likely to underestimate enquiry service activity.

Even a rigorous monitoring process is likely to underestimate enquiries dealt with by B.I.C. staff since not all 'enquiries' will go through the formal enquiry service: for instance when staff attend conferences or visit other institutions they may, in effect, be able to answer enquiries informally. Enquiries answered in this way will often escape the formal monitoring process although they constitute an important part of B.I.C. activity.

The study has concentrated on those external enquiries dealt with by the B.I.C. during 1974/1975 although there are two other enquiry groups who use the B.I.C.'s facilities and

who are mentioned where appropriate:-

Firstly, there were fifty individuals who visited the B.I.C. during the study period to discuss certain aspects of biodeterioration or to do their own literature searches and although they did not go through the enquiry service they do represent an important client group for B.I.C. services.

Secondly, the B.I.C.'s enquiry service and facilities are used by staff and students within the university: these include the staff and research students at the B.I.C., staff from the Biological Sciences and other departments, undergraduate project students, personal tutees of B.I.C. staff, and some of the other undergraduate students in the Biological Sciences department and certain other departments.

7.5.2 Enquiry Numbers and Distribution

During the period under study from January 1974 to August 1975, 145 technical enquiries were dealt with and, as in earlier years, the majority originated from the U.K.:-

Enquiry
Source
74/75

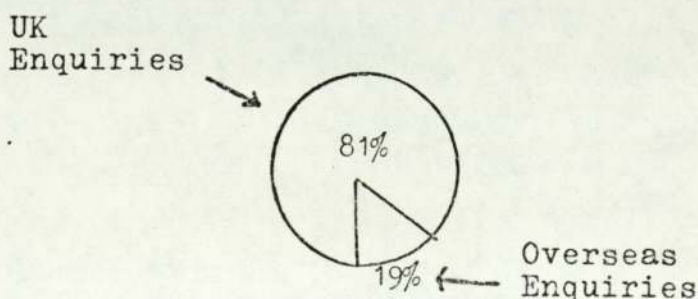
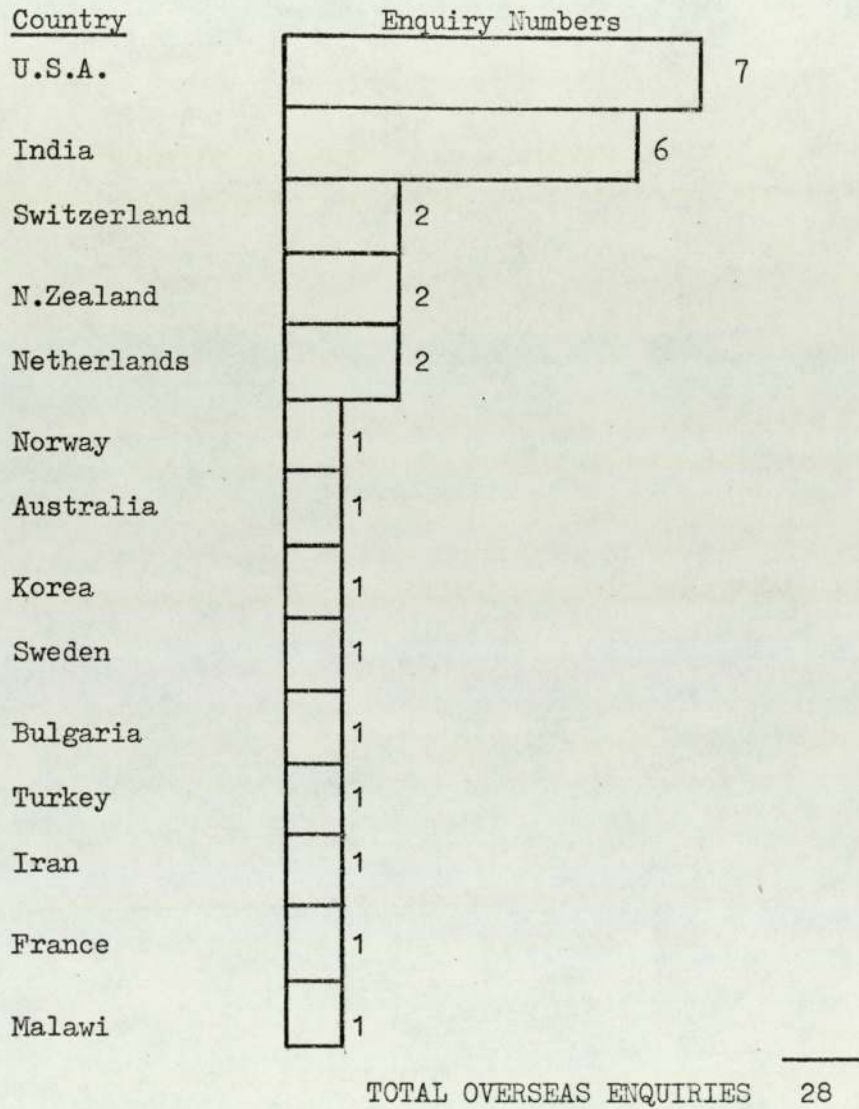
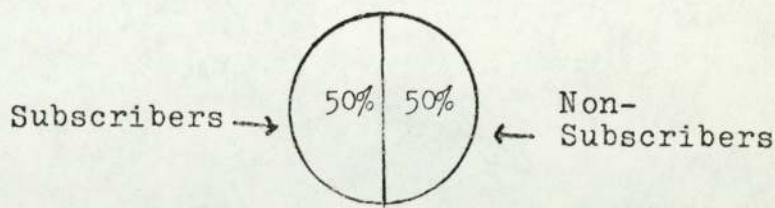


Figure 36 provides full details of the geographical distribution of overseas enquiries, and it shows that 48% of overseas enquiries came from two countries - USA and India.

Figure 36Geographical Source of Overseas Enquiries 1974-1975

As in 1972/1973 there was an equal division between subscriber and non-subscriber enquiries:-

Enquiry
Status
74/76



The fact that as many enquiries were being received from non-subscribers as subscribers is a useful indication of the value of the service in attracting 'new' users to the BIC. and also suggests that the service is particularly useful for those organisations which have isolated biodeterioration problems and which do not feel that a regular subscription is worthwhile.

When enquiry numbers are compared to subscriber numbers for the BIC's two journals it shows that enquiries from overseas are relatively small in comparison to similar figures from the UK:-

	<u>% of</u> <u>Total</u> <u>Enqs.</u>	<u>No of</u> <u>Total</u> <u>Enqs.</u>	<u>No of</u> <u>Subsci-</u> <u>bers</u>	<u>Ratio of</u> <u>Enquiries</u> <u>to Subscriber</u>
U.K.	80.5	117	176	1:1.5
Overseas	19.5	28	525	1:18

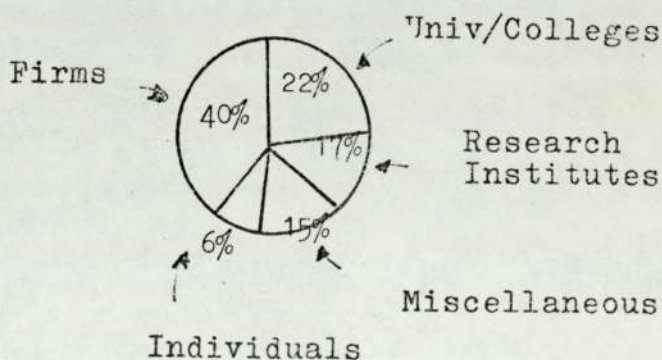
This difference in enquiries numbers is particularly evident when the USA. and the UK. are compared: the USA. with 160 subscribers has comparable subscriber figures to the UK. but produced only seven enquiries during 1974/1975 and a ratio of enquiries to subscribers of 1:23.

The small amount of enquiries received from overseas suggests that many enquiries on biodeterioration are being answered within individual countries and this is not surprising. The BIC.'s publication may have developed an international base but the likelihood of an enquiry service achieving a similar base is small: there is the obvious problem that people may not know of the service but even where they do enquiries may need to be answered quickly and with some knowledge of the local situation. The availability of a wide range of information services in places such as the USA. also means that many enquiries are likely to be dealt with by a country's information system.

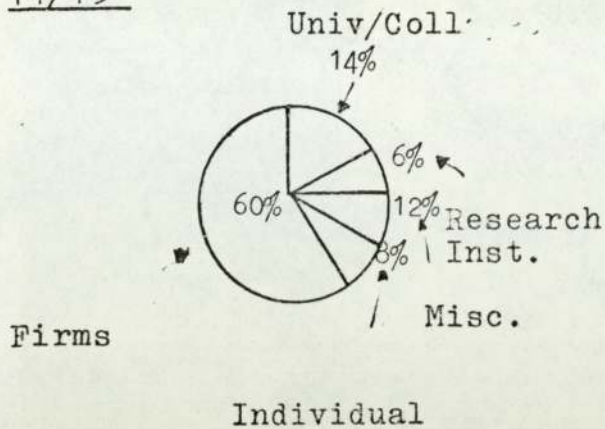
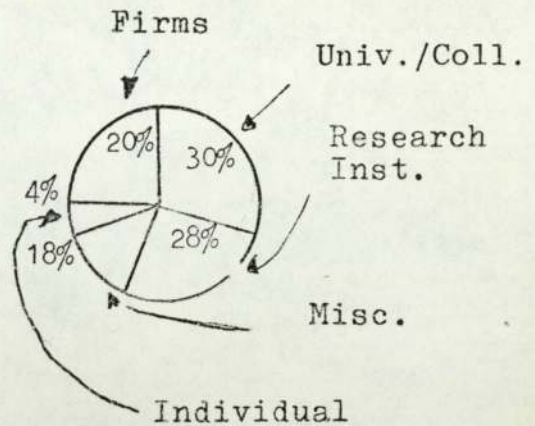
As in 1972/1973 the largest group of enquiries came from industrial firms:-

Institution

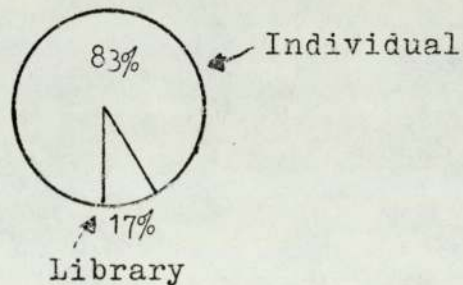
Source/74/75



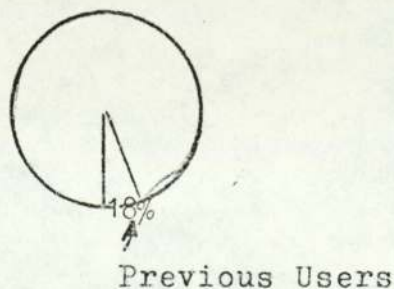
Again, however, the large percentage of industrial firms enquiries came from the UK. while overseas the majority of enquiries came from universities and colleges: this reflects the subscription pattern overseas where the largest percentage of subscribers are found in universities and colleges:

Institution UKSource74/75Overseas

1972/1973 figures showed that the majority of enquiries came from individuals rather than a formalised information source and this is emphasised with the 1974/1975 figures:

Source withinInstitution74/75

The final basic figure for 1974/1975 enquiries details the number of enquirers previously using the service:

PreviousUse74/75

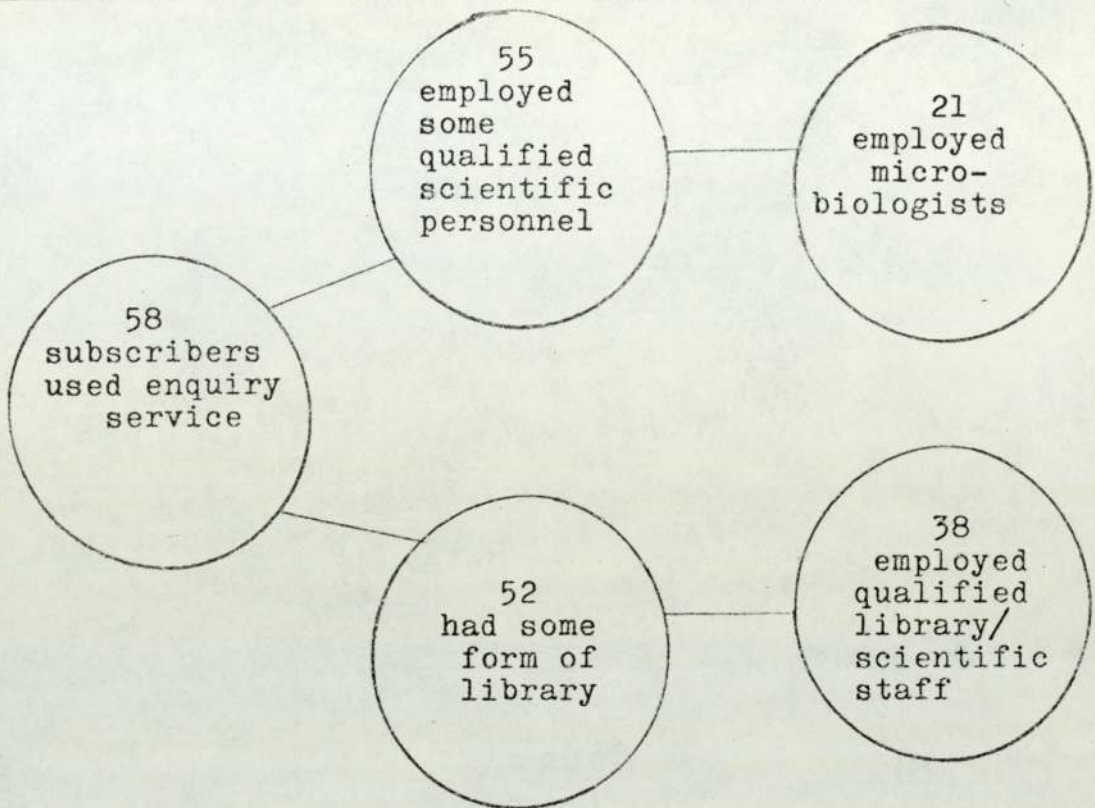
7.5.3 Subscriber Enquiries

The basic figures above refer to the 145 enquiries received during the study period - approximately 50% of these enquiries - seventy three - were from subscribers although a number of subscribers enquired more than once. These seventy three enquiries actually originated from fifty eight subscriber institutions and, with 701 subscribers to the BIC's two main journals, this means that only 1 in every 12 subscribers used the enquiry service in 1974/1975.

For most of the study period the enquiry service was free to subscribers but the relatively low subscriber use of the service suggests that the service's cost was not an important priority affecting subscriber use. Towards the end of the study period, in March 1975, this free enquiry facility was removed and all enquiries involving a literature search were charged for and, in view of the previous low use of the service, this appears to be a sensible decision: a charge is unlikely to significantly affect enquiry numbers from subscribers but it will more adequately reflect the amount of resources spent on answering enquiries.

Examining the scientific resources and library facilities of those subscriber institutions which have used the enquiry service shows that the majority possess some form of information facility and almost all employ qualified scientific personnel. The minimum qualification here for a library is a central document collection and a qualified scientist implies possession of a scientific degree:-

Extent of Library Facilities and Scientific Personnel within
Subscribers Institutions Enquiring 1974/1975



Two of the six enquiring subscribers without library facilities were wood preservation firms and they also regularly used the photocopy service. The other four enquiring subscribers without library facilities consisted of two industrial firms, a research institution and a government department.

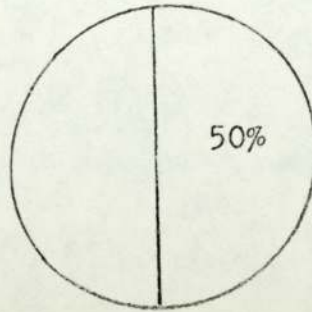
Finally, 23% of subscriber enquiries came from sources within an institution other than the subscriber and this is not surprising when it is remembered that actual user figurers for the journals are, on average, three to four times as great as recorded subscriber numbers.

7.5.4 Non-Subscriber Enquiries

Almost half of the enquiries have come from non-subscribers and in many respects a study of these enquiries is more important than a detailed consideration of subscriber enquiries. Many of the details relevant to enquiries from subscribers have already been dealt with in the previous chapters on the subscription patterns to the BIC's journals. There is also the point that for subscribers the enquiry service is an additional service available when they subscribe primarily to obtain the BIC's journals but for non-subscribers the enquiry service is a major service in its own right, will often be the first contact point, and will lead non-subscribers to the other services offered.

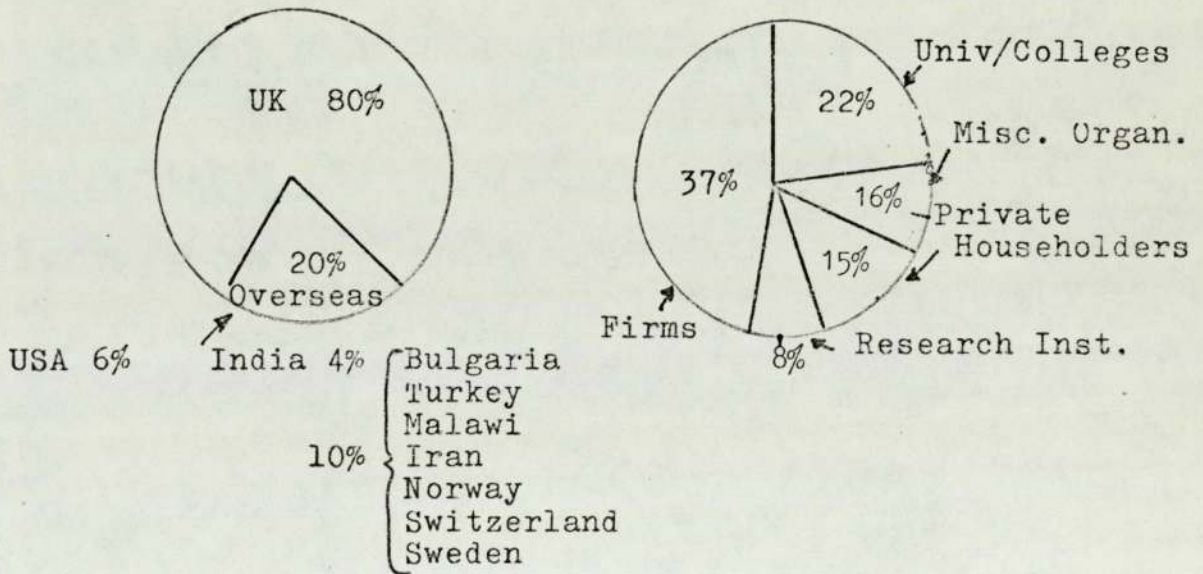
Given this importance of the enquiry service to attract non-subscribers to the BIC's activities the points for consideration are: whether there are any common characteristics of non-subscriber enquiries; whether these enquirers become regular subscribers; whether they are occasional or regular users of the enquiry service; and whether there are any particular sources by which non-subscribers learn about the BIC.

Approximately 50% (ie 72 enquiries) of enquiries received during 1974/75 were from non-subscribers and the geographical and institutional sources of these enquiries are detailed in the figures below:

Non-Subscriber Enquiry Details 1974/75% of 1974/75 Enquiries from Non-Subscribers

geographical source
of non-subscriber
enquiries

institutional source
of non-subscriber
enquiries



Although the highest percentage of enquiries have come from industrial firms the institutional source of non-subscribers is relatively varied. 80% of the enquiries have originated in the UK which is perhaps not surprising: many enquiries originating in other countries are likely to have been dealt with by the information infrastructure in those countries. Neither are the overseas enquiries concentrated in any particular geographical area with the developed and developing countries being represented.

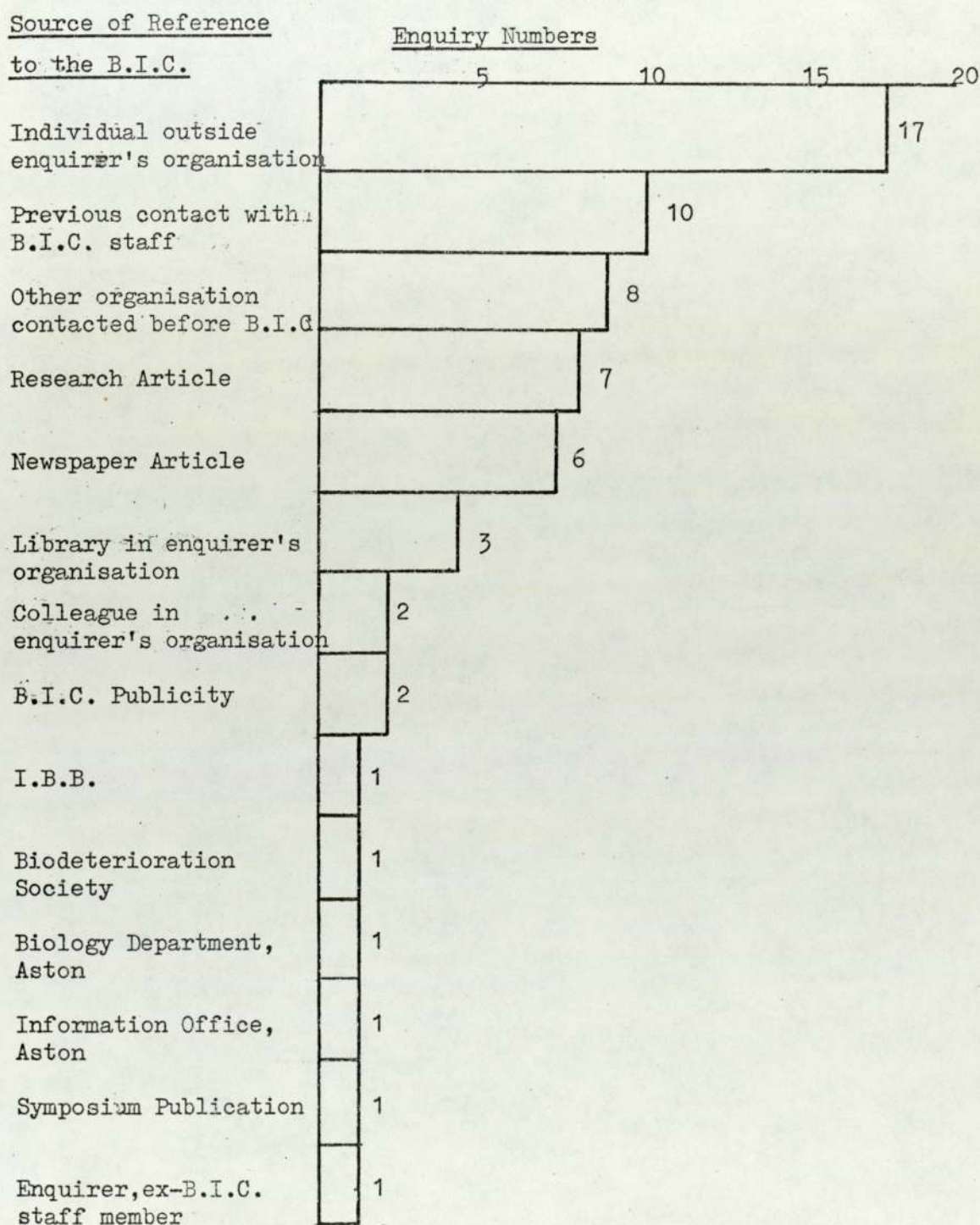
An interesting group of enquiries are those from private householders: this source has produced 15% of total non-subscriber enquiries and in numerical terms this covers eleven enquiries. Nine of the householders lived in the West Midlands and this represents the only noticeable geographical concentration of enquiries.

Biodeterioration problems occur wherever materials are being put to use so a group of enquiries from householders is not surprising but what is interesting is the way that these householders discovered the BIC: of the nine West Midlands enquirers, two had enquired to the university and been passed on to the BIC. while six had come across items on the BIC's activities in the local press, although the items did not mention the BIC. by name but referred to conferences and research projects being undertaken by BIC. staff. Here then is another aspect of the influence of the media on the number of enquiries received by the BIC. and of the ability of a particularly localised communication channel to generate enquiries of a similar type: all the enquiries were concerned with the 'best ways' of removing a particular organism from their home.

It has also been possible, with most of the other non-subscriber enquiries, to discover the methods by which enquirers came to approach the BIC. and these are detailed in Figure 37 . The referral sources given in Figure 37 show particularly well the relationships between research at the BIC. and its information services and the importance of the involvement of the BIC. in the scientific community. In this respect, the present and previous activities of BIC

Figure 37

Non - Subscriber Enquiries 1974/1975

Introduction Point to the B.I.C.

TOTAL ENQUIRY NUMBERS

61

staff, including undertaking research, writing articles and research reports and attending conferences, have all generated enquiries while the highest percentage of enquiries have been referred to the BIC by individuals working in the biodeterioration field. Approximately 28% of the enquirers detailed in Figure 37 were referred to the BIC. by individuals and this 28% represents seventeen enquirers: ten of these seventeen enquirers were referred to the BIC. by Biodeterioration Society members, four other individuals referring enquiries were known by BIC. staff, one had previously used the enquiry service, and only two had no apparent research interest in biodeterioration. Also no individual was cited as a referral source by more than one enquirer.

Other organisations - comprising research institutes, universities, and firms - which were initially contacted by the enquirers for information have also referred a substantial group of enquirers to the BIC.

However, if the involvement of the BIC. in the scientific community has produced a considerable number of enquiries, formal publicising methods and information services are hardly represented as referral sources. For instance, only 2 enquiries have been a direct result of the BIC.'s own publicity although this is not surprising as the BIC.'s publicity mailings are primarily concerned with advertising their publications. 5% of enquirers (ie 3 enquirers) were referred to the BIC. by formal library and information systems and with all enquiries the library was in the enquiring institution.

This raises the question, are external information systems not represented as contact sources because they are not used by prospective enquirers or because they are contacted but are unable to trace the existence of the BIC? Various studies (Allen 1966, Line 1970, Pearson 1973) have expressed concern over the under utilisation of information services thus supporting the former statement above but a small investigation carried out in this study provides some evidence of the latter view:-

Twelve central public libraries were contacted by telephone and asked if they could provide information or refer the enquirer elsewhere for information on a typical biodeterioration problem concerning fungus growth in a fuel storage tank. The libraries were chosen because of their proximity to the researcher rather than by any sound methodological means and although only twelve libraries were contacted, their responses, outlined below, give some hints as to the ability of the public library system to answer enquiries on biodeterioration.

Answers Given to Enquiry on Fuel Storage Tank Growth

Public Library A	-	Negative answer
"	"	B - Negative answer
"	"	C - Referred to Ind. Research Association * ✓
"	"	D - Referred to Ind. Research Association * ✓
"	"	E - Referred to 2 Ind. Res. Assocs* & 1 firm
"	"	F - Negative answer
"	"	G - Referred to Ind. Research Association ✓

Public Library H - Referred to a University Department
 " " I - Referred to Ind. Research Association* ✓
 " " J - Referred to Ind. Research Association ✓
 " " K - Referred to Industrial Firm ✓
 " " L - Negative Answer

* - refer to the same research association

✓ - BIC subscribers

None of the libraries were able to provide any documented information from their own stock and although eight libraries referred the enquirer to other sources none of them mentioned the BIC. However, it is likely that most of the sources referred to would have been able to provide some answer for the enquirer, if the enquiry had been taken further, and as 60% of the sources mentioned were BIC subscribers it is also possible that the enquiry would ultimately have reached the BIC.

Given that the term 'biodeterioration' is relatively new (Eggins 1967) and that the staff dealing with this hypothetical enquiry were unlikely to be subject experts, then it also seems unlikely that the libraries would have identified the problem as one of biodeterioration. If this is so then it is encouraging to know that the majority of libraries were able to refer the enquirer to a source that could provide some form of answer. Nevertheless, it is also unfortunate that it seems that some enquiries are absorbed into the information system without reaching the BIC where an obvious group of subject specialists exist.

Returning to the major referral sources for non-subscriber enquiries the importance of individual workers, both within the biodeterioration research community generally and at the BIC, as referral sources to the BIC suggests that those enquiries that have reached the BIC have also come from individuals and organisations with research interests.

The terms "engineers" or "technologists" have been used by writers (Allen 1966, Ladendorf 1970) to describe those individuals who are concerned with practical problems of a day-to-day nature, do not become involved in research activities or any research communities, and are usually found in industrial firms. Logically, therefore, it would appear that these practitioners do not develop contacts with individuals in the research community and if this is so then, given the major contact sources for the BIC, it suggests that the BIC is primarily serving the research community and answering few enquiries from practitioners.

To consider this possibility the enquirers detailed in Figure 37 were categorised according to the nature of the work and the categories were: enquirers engaged in full time research, defined here as scientific study of at least one years duration; enquirers engaged in product testing; enquirers engaged in product testing and some research work; enquirers previously engaged in research but now in other activities; and enquirers not engaged in scientific research or product testing and not previously engaged in such work. The results of this categorisation are given below:-

Type of Work of Enquirers 1974/75

(a) Enquirers referred to BIC by individuals	1. Engaged in full time research	35%
	2. Product testing	18%
	3. Product testing and Research	6%
	4. Previous experience in Research	12%
	5. Not engaged in Scientific res. or product testing.	29%
(b) Total Enquirers referred to BIC. by methods given in Figure 37 .	1. Engaged in full time research	18%
	2. Product testing	19%
	3. Product testing and Research	8%
	4. Previous experience in Research	11%
	5. Not engaged in Scientific res. or Product testing.	44%

The figures above show clearly that the BIC is not purely serving the research community: almost half of the enquiries from non-subscribers were from enquirers with no apparent contact with the research community and even with enquiries referred to the BIC. by individuals almost 30% originated from enquirers with no research or product testing experience. These figures provide evidence to suggest that the BIC is functioning well as part of a technological university and as part of an institution which aims not only to educate and carry out research internally but also to educate and provide information to as wide a range of

individuals and organisations externally as is possible: in this respect it is worth noting that the enquirers comprising the 44% with no research experience include not only individuals in firms and research organisations but also journalists schoolchildren, teachers, librarians, consultants, individuals from voluntary organisations, editors, builders and householders.

Use of external information services is also often allied to the existence of internal information systems in an organisation producing the assumption that organisations not in contact with a research community and without any library facilities are unlikely to know of and use external information sources: this particular view was expressed by Bhattacharya (1973) in a study of information services for small industry. However, it could be argued that the absence of an internal information service forces that organisation to look externally for information.

Considering again the enquirers detailed in Figure 37 and excluding enquiries from householders, it is interesting to note, therefore, how many of these were located in organisations without any library facilities. A library here is defined as any centralised document collection. Approximately 20% of the institutions do not possess library facilities and when enquiries from householders are added it means that approximately 30% of enquiries were from organisations and individuals with no access internally to library facilities.

Bringing library facilities and research experience

together it also appears that approximately 15% of enquiries were from organisations possessing neither and, again, if enquiries from householders are added it means that approximately 25% of enquiries were from sources with no research experience or library facilities.

The substantial minority of enquiries coming from sources without any research experience or library facilities therefore, sheds some doubt on Battacharya's view (1973).

7.5.5 Subject Distribution

Bearing in mind the specific points made about subscriber and non-subscriber enquiries in the previous two sections, this section and the following sections consider other characteristics of the enquiries received and the answering process.

As with 1972/73 enquiries, 1974/75 enquiries have been classified according to their subject area and the subject areas where more than one enquiry was received are detailed in Figure 35.

Particularly noticeable during this period has been the increase in enquiries on waste materials biodegradation: they accounted for 26% of the enquiry total compared with 12% in 1972/73. An enquiry increase which is likely to be due to the interest generated in waste recycling generally and given further impetus by the publication of, and advertising of, the BLC's new journal Waste Materials Biodegradation Research Titles in 1974.

Other subject areas with large enquiry numbers were rubber and plastics, foodstuffs, stone and concrete, hydrocarbons, and wood preservation. There is some continuity in the major enquiry subject areas as all these above subject areas, excluding stone and concrete, also appeared as major enquiry areas in 1972/73.

The incidence of similar enquiries, however, was again

low and interestingly a large number of similar enquiries resulted from the discussion of biodeterioration problems in 'popular' journals and the press:-

1. As in 1972/73 the interest in methane production, generated by The Surveyor article, continued. (5 enquiries were received on this topic).
 2. Similarly, biodegradable plastics was a popular topic (4 enquiries received)
- and
3. The publication of a small news item in the Birmingham Evening Mail reporting a conference on Rodent Control held at Aston University also generated 3 enquiries from householders with pest control problems.

The so-called 'popular' scientific press and the popular press, therefore are capable of generating enquiries usually of a relatively general nature. The Surveyor article, for instance, generated enquiries for over three years from 1972 to 1975 while the news item in the Birmingham Evening Mail did not specifically mention the BIC, yet enquiries were filtered through the university. If necessary, therefore, it appears that the enquiry numbers of the BIC could be increased by the publicity of its activities in such sources as noted above and perhaps it would form an interesting research study to monitor the effects on the BIC's use patterns of the inclusion of regular news items and articles, citing the BIC, in popular journals and newspapers.

Similar enquiries, requiring literature searches, were also obtained on book biodeterioration, the effects of heat on fungi in wood and plastic sealant deterioration.

Finally, in 1974/75 and in 1972/73 a group of enquiries covered toxicity problems associated with chemical compounds and all these originated from the same firm. Toxicity problems are not within the main scope of the BIC's activities and there are other services which cover toxicity problems in more detail yet the firm continually used the BIC despite being told that toxicity problems were only of peripheral interest to the BIC. Perhaps, as a subscriber firm, it was using up its free enquiry time and, if so, it will be interesting to see if this use continues now that enquiries are charged for. Alternatively, the firm may have used the BIC because it was relatively easy to use by simply picking up the telephone: perhaps an example of the contention by Allen (1966) that ease of use is a more important criteria in choosing an information service than service effectiveness.

7.5.6 Enquiry Type and Answering Procedure

Enquiry Type

The earlier sections have outlined the distribution of enquiries, the type of institutions providing enquiries, the research and library facilities of enquirers and their contact methods. All these investigations will have provided some hints as to the type of enquiries being answered by the BIC. but in this section an attempt is made to classify all the 145 enquiries into a number of categories according to the nature of the enquiry and the type of answer required. Included in these categories will be those enquirers who contacted the BIC. without knowing of the existence of its information services.

The enquiry categories, based on the nature of the enquiry, are:-

- (a) 'The Quick reference Enquiry' - the enquirer requires one item of information such as the name of an organism, the name of a firm, or the name of an author.
- (b) General enquiries on Biodeterioration - the enquirer requires general papers describing the problems and extent of biodeterioration.
- (c) Enquiries on a particular process - the enquirer requires information on the development and implementation of a particular process, such as the production of methane process mentioned in The Surveyor.

- (d) Enquiries on a particular technique/method - the enquirer requires information on a laboratory technique for use in his experiments.
- (e) Enquiries on practical problems - enquiries which require information to stop or prevent biodeterioration of a particular material or product which is usually already in use or has been marketed. These enquirers generally need a quick answer to solve the problem within a short time period: for the purposes of this classification a three month period has been set as the time limit desired in solving the problem.
- (f) Enquiries for Studies/Research Projects - enquiries have been included in this section where a particular aspect or problem of biodeterioration is being studied for not less than three months duration. It contains a number of groups of enquiries which may be classed as 'study/research' enquiries although the exact nature of specific enquires may vary group to group: these differences may be due to the level or length of the study, the status of the person or team undertaking the study, the access of the enquirer to research and library facilities and the type of information they require.

This category also includes enquiries similar to those included in the 'Practical Problem' category: 'practical problem' enquiries usually involve products in use while similar enquiries in this category are concerned with products in the

development stage where an investigation of the possibilities of biological growth is being carried out.

In other instances, the difference in enquiries contained in the two categories will depend on the material being investigated: manufacturers of food products experiencing biodeterioration problems are likely to require information urgently so as to undertake remedial action and maintain their reputation in the market. However, where biodeterioration affects a material used in an industrial application or a hidden building material and does not impair the effectiveness of that material immediately, then urgent remedial action is not necessary and there is time for a detailed study of the problem.

(g) Miscellaneous Enquiries - included in this category are those enquiries which do not fit easily into any of the above categories.

To some extent the above classification is arbitrary but there appears to be enough common characteristics of certain groups of enquiries to make the classification worthwhile. Therefore, the 1974/75 enquiries have been categorised in this way using information from the enquiry correspondence and by contacting certain enquirers, as the figures below indicate:-

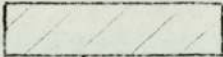






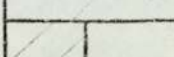
<u>Total Enquiries 1974/75</u> = 145	<u>% of Total Enquiries</u>
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Information obtained from Enquiry correspondence/documents	with	41%
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Information obtained from telephone conversation with enquirer	with	33%
Information obtained from postal questionnaire with enquirer	with	19%
No information available	with	7%

Based on the information received the enquiry classification is given below:

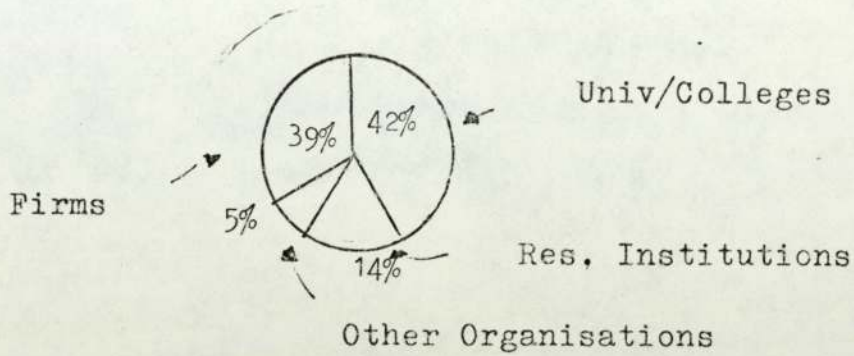
Enquiry Classification 1974/75

<u>Enquiry Category</u>	<u>Approx.% of Enquiries 1974/75 within this category</u>	
a. Quick reference		12%
b. General Biodeterioration.		3%
c. Process		3%
d. Techniques		4%
e. Practical Problem		17%
f. Study/Research		51%
g. Miscellaneous		3%
h. Unknown		7%
		<hr style="width: 100%; border: 0.5px solid black;"/> 100%

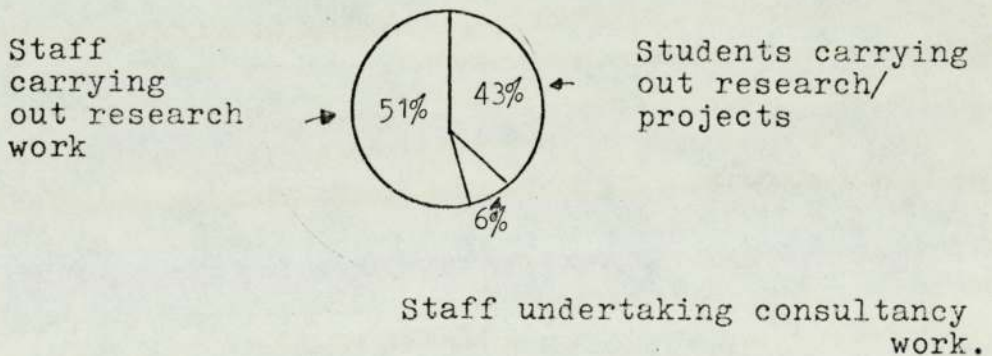
Given the relatively broad definition of Category f - study/research enquiries - it is not surprising that the majority of enquiries fall into this category. Within this category an almost equal division of enquiries has been received from firms and universities and it is also possible to identify certain enquiry groups with other common characteristics:-

Distribution and Type of Enquiries in Study/Research Category

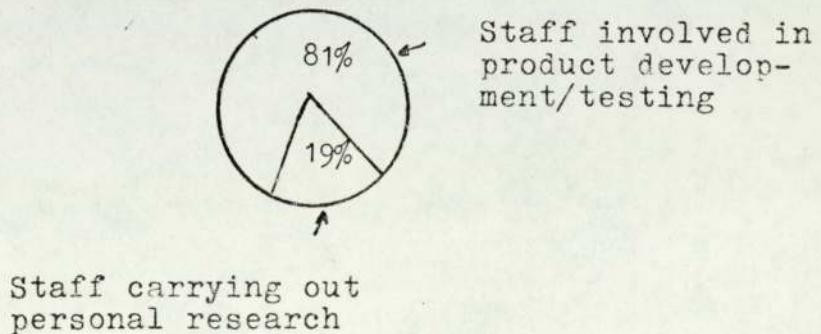
(a) Institutions



(b) Nature of Enquiries received from Univs/Colleges



(c) Nature of Enquiries received from Firms



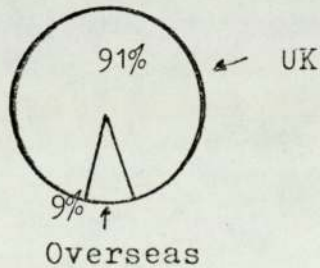
The majority of study/research enquiries coming from the higher education sector have come from persons involved in research work with a considerable number coming from

students: many of these students were undertaking projects of three or four months duration so perhaps the term 'research' is a little flattering! Similarly, the large majority of enquiries from industrial firms were concerned with material and product testing and much of their work was less than one years duration.

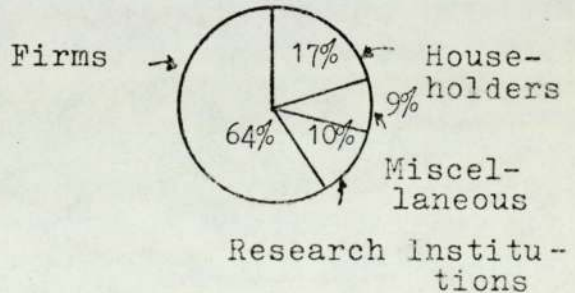
76% of the enquiries in this category came from the UK and 24% from overseas but in the 'Practical Problem' category the concentration of enquiries in the UK is more marked:-

Distribution of enquiries in 'Practical Problem' Category

(a) Geographical Distribution



(b) Institutional Distribution



The large percentage of enquiries from the UK is hardly surprising as these enquirers often need to discuss their problems and require quick answers: therefore it is likely that similar enquiries overseas will be dealt with in individual countries.

78% of enquiries in this category came from UK non-subscribers including industrial firms (44%), householders

(17%) and miscellaneous organisations (17%). This suggests that the majority of 'practical problem' enquiries will come from non-subscribers with 'one off' problems who are also unlikely to take out a regular subscription to the BIC. In this respect, therefore, the value of subject specialists at the BIC is obvious: they can discuss the problem with some authority and, if necessary, carry out laboratory tests to answer the enquiry. Given that regular subscribers to the BIC are only likely to reach about 20% of the total potential market (Martyn 1970^a) then the income that can be generated, for laboratory tests and analytical answers, from these occasional enquiries becomes an important source of finance for the BIC.

The other major enquiry category is the 'Quick reference' enquiry and although various items of information have been asked for the enquiries do fall into two groups: those enquiries that could have been answered equally as well by other information sources and those enquiries that may not have been easily answered by other information sources. Approximately 30% of enquiries fall into the former group and include enquiries on the address of firms and organisations and enquiries requiring bibliographical information on a certain document while 70% of enquiries fall into the latter category and include enquiries covering such things as the research interests of particular individuals, the names of individuals working in a particular research area, the availability of a particular culture, and the activities of bodies and organisations specifically working in the field of biodeterioration.

Answering Procedure

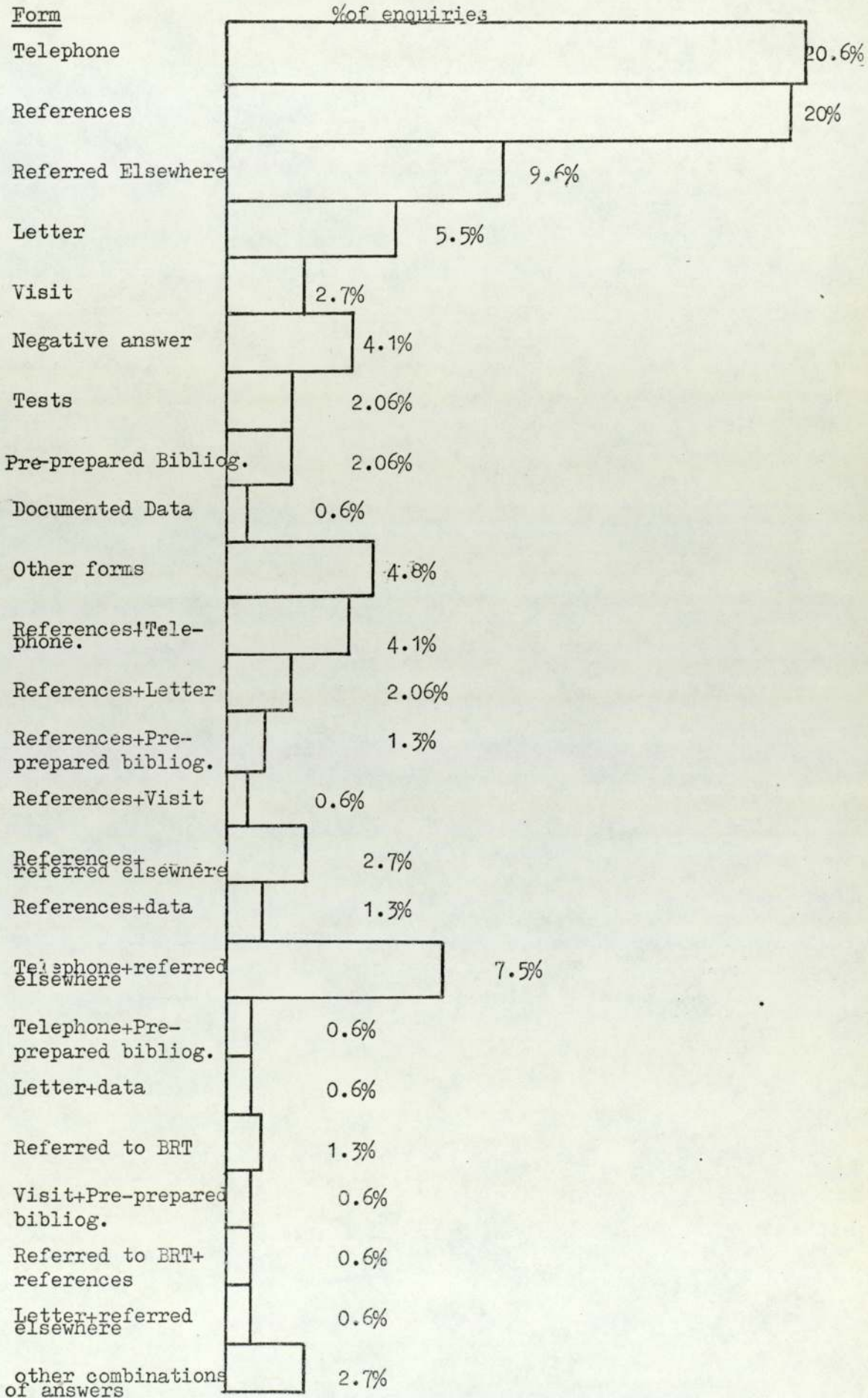
Given the above enquiry categorisation this section considers how the enquiries were answered by the BIC. Organisational factors which will influence the answering procedure include the availability of a group of experts at the BIC, the absence of any person employed full time on the information services, the existence of a document collection at the BIC and the possibility of contacting the BIC by letter, telephone or a visit. During this period subscribers were also able to use an enquiry card, situated at the back of Biodeterioration Research Titles, which enabled them to state any preferred form of answer (an example of this card is given as appendix 1).

Figure 38 details the answer methods for the 145 enquiries and as might be expected from an information service which is not solely dependent on its document collection the answer methods used are varied, with telephone answers and references being given as answers most frequently. 21% of enquiries were answered solely with a telephone conversation and 20% were answered only with references. Telephone answers and references were also given as part answers with other enquiries and their total use in enquiry answering is as follows:-

Telephone used in answering	-	31% of enquiries
References given in answering	-	33.5% of enquiries

The other major method used in enquiry answering was

Figure 38

Form of Answer given with 1974/1975 Enquiries

to refer the enquirer to an information source elsewhere: this referral process was the only method used with 11% of the enquiries and another 11.5% of enquirers were referred to contacts elsewhere as part of the answer.

Although reference dissemination represents the largest source of enquiry answering it only accounts for just over a third of the answers despite the maintenance of a document collection.

The staffing of the BIC. with subject specialists will remove some of the direct dependence on a document collection and will also provide, in some instances, a preferable alternative to reference dissemination for enquiry answering. An answerer, for instance, may be able to provide information from his knowledge which may be sufficient to answer the enquiry and, if not sufficient, a literature search can always be undertaken as the second stage in the answering process. Five of the enquiries answered by telephone involved the answerer contacting the enquirer for clarification and discussion and then being able to answer the enquiry satisfactorily over the telephone.

When the nature of the enquiry is added to the subject expertise at the BIC. this can also affect the answer given. In all but one instance, for example, a 'practical problem' enquiry has been answered by using the telephone and only one 'quick reference' enquiry has been answered with references and even here information was also conveyed by telephone.

With the subject expertise of the BIC. and the nature of enquiries received there is also another factor which may influence the form of answer given and this is the form of contact made in presenting the enquiry to the BIC.. Figures are given below concerning the methods of contact for the 145 enquirers:

<u>Contact Method Enquiries</u> <u>1974/75</u>	<u>% of enquirers</u> <u>using this method</u>
Telephone	47%
Letter	34%
Subscriber Enquiry Card	17%
Telex	1%

The high percentage of enquiries received by telephone also suggests that a significant number will also be answered by telephone and possibly answered immediately when the call arrives. Figures below show in more detail this relationship between the form of contact of an enquiry and the form of answer given:-

Telephone Enquiries 1974/75

% of enquirers contacting BIC by telephone	47%
% of enquirers being answered by telephone	31%
% of enquirers contacting BIC by telephone and also being answered by telephone	26%
% of enquirers contacting BIC by telephone and being answered by telephone at the time of the call	9.5%

The above figures show quite conclusively that the

majority of enquirers answered by telephone were also those that contacted the B.I.C. by telephone.

The various factors outlined above, therefore, all contributed to reducing the direct use of the document collection for answering enquiries. Nevertheless, it is likely that many of the answers were based on information previously obtained from published sources. For instance, information given by a subject specialist over the telephone is likely to have come originally from some document seen by that specialist so although the document collection may not be used directly the importance of documented information is still evident.

Obviously, the document collection is also used by students and other visitors to the B.I.C. and researchers at the B.I.C. so its usefulness cannot be assessed purely in terms of its contribution to the enquiry service. This point will be considered further in Section 7.8 which examines the costs of the service and its income producing capabilities.

After telephone contact and reference dissemination the other major method of dealing with enquiries is to refer the enquirer elsewhere. This was used as the sole method of answering with 11% of enquirers and other sources were referred to as part of an answer with another 11.5% of enquiries: the total percentage of 22.5% represents thirty two enquiries and in thirty one instances the enquirer was referred to an individual working in the biodeterioration field. These figures not only show the capability of the B.I.C. to refer the

enquirer elsewhere when its resources are unable to provide an answer but also reinforce the hypothesis, outlined in the introduction, that the B.I.C. has benefited from its involvement with the scientific community: the referring of enquirers to subject specialists elsewhere is a practical example of the use being made by the B.I.C. of the scientific community to support its information services.

The telephone, reference dissemination and referral elsewhere may have been the main methods of enquiry answering but there were also a variety of other methods used, many of which again reflect the subject expertise of the B.I.C.: letters containing comments from staff, laboratory tests, visits and consultations with B.I.C. staff, and the preparation of reviews all emphasize this expertise and, in total, have been involved in answering 18% of enquiries.

Finally, Figure 38 shows that the B.I.C. has been able to give positive answers to 96% of enquiries and the 4% given negative replies represents six of the 145 enquiries received. One of the enquirers required information on a particular firm which the B.I.C. could not supply, one enquiry was not within the scope of the B.I.C.'s subject coverage, and with four enquiries literature searches were undertaken which produced nothing relevant.

The range of answers available from the B.I.C., therefore, is evident from the above description and the remaining paragraphs in this section now consider briefly some other features of the B.I.C.'s answering procedure.

Staff Time

A measurement of staff time involved in enquiry answering was obtained by the answerers recording their answer time on an internal BLC. questionnaire (Figure 31) and the total figures resulting from times detailed are as follows:-

Staff Time Involved in answering enquiries 1974/1975

	<u>Total Staff Time for Study period Jan 74-Aug 75</u>	<u>Average Staff Time per week</u>
Scientific Staff	68 hours	@ 51 mins
Clerical Staff	28 hours	@ 20 mins
Total	<u>96 hours</u>	<u>71 mins</u>

Based on the average weekly pay of academic and clerical staff in 1974 and 1975 this suggests that approximately £120 of staff time was involved in the enquiry service per year representing only $7\frac{1}{2}$ man days per year. The relevance of these figures within the overall income/expenditure pattern of the BLC. is considered in Section 7.8.

Answer time figures also show that 93% of the enquiries each took up less than an hour of staff time and that answers to 50% were produced within twenty minutes:

<u>Time taken to complete answer</u>	<u>Cumulative % of 1974/75 enquiries answered</u>
0 - 10 mins	40%
11 - 20 mins	55%
21 - 30 mins	72%
31 - 40 mins	77%
41 - 50 mins	84%
51 - 60 mins	93%

Resources external to the BIC

Apart from referring enquiries to other sources the BIC occasionally used external sources to obtain an answer which was then passed onto the enquirer. This process occurred with 9.5% of enquiries (representing 13 of the 145 enquiries). On six occasions individuals outside the university were contacted for advice before an answer was given, four enquiries were answered with information from the university library and staff in the biology department contributed three answers.

The Delay between enquiry receipt and answer transmission

Although one aspect of the time involved in answering an enquiry has already been considered, namely staff time involved, of direct importance to users of a service is the time delay involved before an answer is provided. In the particular instance of the BIC, the presence of 'practical problems' enquiries suggests that urgent answers are often needed while the major use of the telephone also suggests that a mechanism exists for providing quick answers. The answer times for the 145 enquiries are given below:

Answer Time (weeks) for 1974/1975 Enquiries

	<u>Cumulative %</u>
% of Enquiries answered within 1 week - 49%	49%
" " " " " 2 weeks - 11%	60%
" " " " " 3 weeks - 12%	72%
" " " " " 4 weeks - 10%	82%
" " " " after 4 weeks - 18%	100%

The average answer time for UK enquiries was eleven days and for overseas enquiries, forty one days. The lengthier average for overseas enquiries is largely due to the fact that 50% of overseas enquiries took over a month to answer, with half of these enquiries taking over two months to answer. Unfortunately many overseas enquirers suffered particularly as a result of staff illnesses and holidays at the BIC: practical factors which influence the effectiveness of a service operated by only one or two people. Nevertheless, the great majority of enquiries are answered within a month and almost half are answered within a week. There were 20% of enquiries which were answered on the same day that they were received and the majority of these enquirers were telephone callers. The 20% represents thirty enquirers and twenty four of these contacted the BIC. by telephone: eleven were answered at the time of calling and the other thirteen were called back during the same day. The flexibility of the BIC. in answering enquiries is also shown by the answer times for certain types of enquiries: 90% of the 'practical problem' enquiries, requiring quick answers, were answered within a week, 85% of the 'quick reference' enquiries were also answered within a week, while only 32% of the 'study/research' enquiries were dealt with within a week.

7.6 Users' Evaluation of the Enquiry Service

A final aspect of the enquiry study was to consider how far the answer given had actually helped the enquirer, either through increasing his problem solving ability or by increasing his knowledge of a particular subject area. With some enquiries this was obvious (i.e. enquirers requiring a specific name, address, etc.), but with other enquiries not as easy to discover.

To do this, a brief postal questionnaire was sent to a sample of non-subscriber enquirers in 1974/1975 (part of the overall questionnaire to enquirers - see Figure 32) to try and obtain the following information:-

(a) the reason and nature of the enquiry - i.e. to solve a specific problem, beginning a project, exploring new subject area, etc., and

(b) the usefulness of the answer supplied, i.e. if a specific problem, did the answer solve the problem, or if a study/research enquiry, did the answer increase the enquirer's knowledge of the subject?

The type and nature of enquiries being submitted to the B.I.C. has already been considered in Section 7.5.6 but a low response rate to the questionnaire reduced the level of specific information available on the usefulness of the enquiry answer: only 33% of the sixty non-subscriber enquirers contacted returned the questionnaire. Therefore, the results have limited value although they do suggest that the majority of enquiry answers provide a positive contribution to the enquirer's problem or study area, as the following figures show.

Comments by respondents on the usefulness of enquiry answers(based on questions in Figure 32).

	<u>Approx. % of Replies</u>
1. Answer solved enquirer's problem (or showed that problem could not be solved)	10%
2. Answer increased the problem solving ability of the enquirer	22%
3. Answer was of no use in solving problem	9%
4. Answer increased knowledge of subject under study	47%
5. Answer did not increase knowledge of subject under study	12%

7.7 The Photocopying Service

The document collection also provides the raw material for the B.I.C. photocopying service and this section looks briefly at the use patterns of this service. The photocopying service is directly linked to the bibliographic journals where cited references can be obtained from the B.I.C. In 1974 photocopying charges were 4p per page and in 1975, 5p per page.

The study by Sternberg (1971) showed that hard copy availability at an information centre was a low priority factor affecting a prospective user's decision to subscribe and the information obtained for this study also suggests that most B.I.C. subscribers use other means than the B.I.C. to obtain references (Chapter 5 Section 3.6).

However, during the 20 month study period between January 1974 and August 1976, 137 photocopy requests were received producing an average of almost 7 requests per month. The 137 requests came from eighty four separate sources with 58% of these located in the UK and the remaining 42% distributed overseas.

From 1970 up to 1974 there had been eleven requesters who could be defined as regular users of the service: anyone using the service at least once per year is considered a regular user. Nine of these users were still using the service during 1974 and 1975 and these nine 'regular' users represent only 1.2% of total subscribers. However, there

were also another thirty users during 1974 and 1975 who had previously used the service: therefore, 5.5% of total subscribers had used the photocopying service on more than one occasion.

There were also repeat requests from the same source during the twenty month study period and the relevant figures are given below:

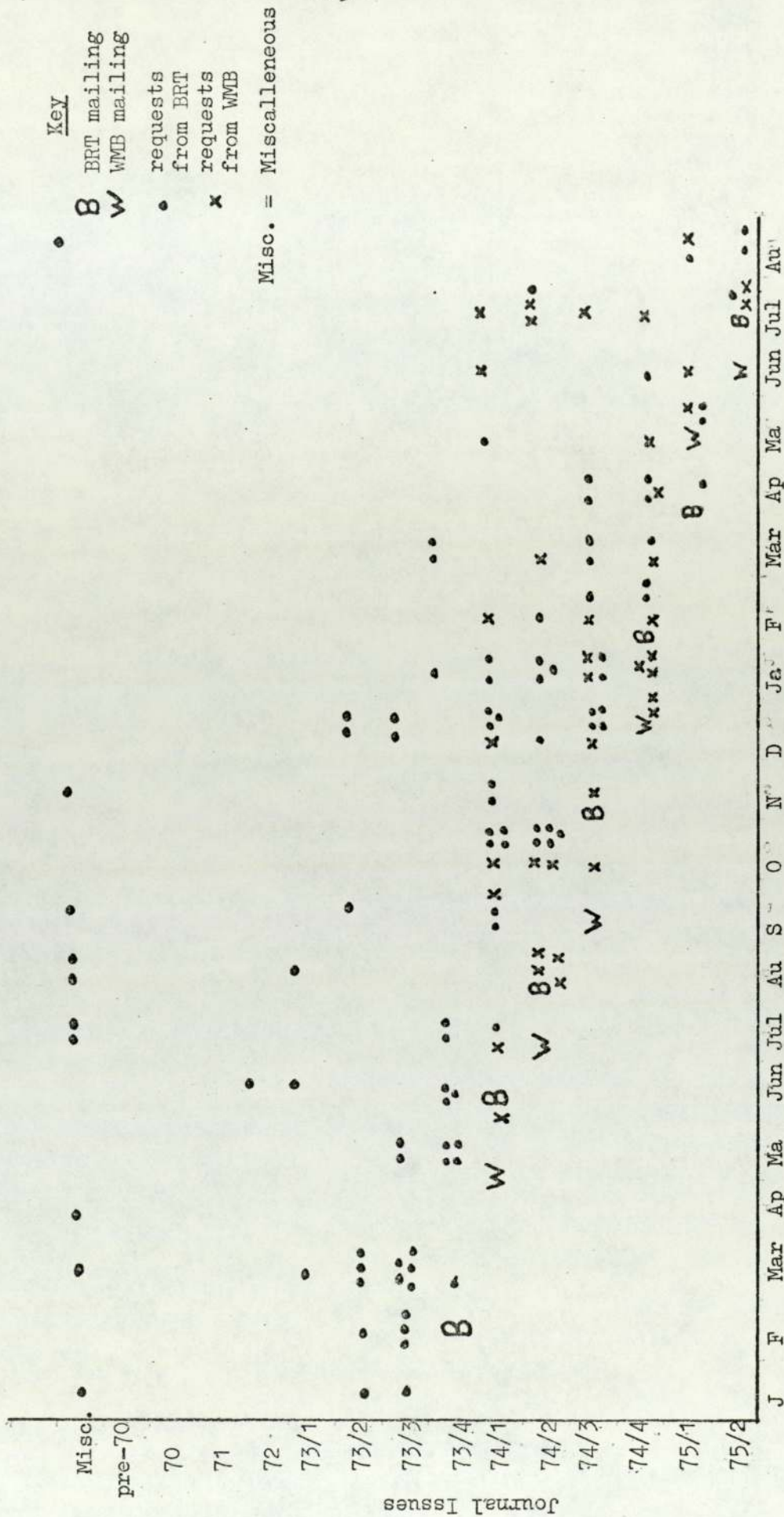
Photocopy Requests 1974/75

67%	used service	once	from Jan 74 to Aug 75						
15%	"	"	twice	"	"	"	"	"	"
6%	"	"	three times	"	"	"	"	"	"
7%	"	"	four times	"	"	"	"	"	"
3%	"	"	five times	"	"	"	"	"	"
2%	"	"	seven times	"	"	"	"	"	"

800 documents were requested during 1974 and 1975 with thirty seven documents being requested twice and one document being asked for three times: 761 separate documents, therefore were actually asked for. The distribution of requests over the period is given in Figure 39 along with the despatch dates of the journals and the source journal for the request. Waste Materials Biodegradation Research Titles did not appear until 1974 and up to August 1975 28% of the requests required references from this journal. The remaining requests covered material in BRT. with 36% requiring material in issues after January 1974 and 36% requiring earlier material.

Figure 39

Photocopy requests received per month from January 1974 to August 1975



Months

Nevertheless, Figure 39 shows particularly the current awareness function of the photocopy service with clusters of requests usually following the mailing of a journal issue. With requests for references from Waste Materials Biodegradation Research Titles the first request has usually been received within three weeks of the journals despatch followed closely by others. However, no regular pattern emerges with BRT except that requests are generally concentrated in a five month period after an issue's mailing. The number of documents requested during this period from each journal issue varies from twenty five to sixty five separate documents per issue. In 1974 there were eight issues of two bibliographic journals citing 4,800 references and by August 1975, six months after the mailing of the last issue, 320 documents had been requested from these issues representing 6.6% of documents cited.

The subject distribution of the requests is interesting since it again reflects the predominance of certain areas in BRT and, to some extent, the subject interests of subscribers. It has already been noted that 28% of requests required references from Waste Materials Biodegradation Research Titles and these requests covered 151 documents. 610 documents were requested from BRT covering fifty two subject sections. The timber sections in BRT contained the highest percentage of BRT documents requested, representing 16.5% of BRT photocopy requests. In Chapter 3 (Section 3.2.2) figures showed that the timber sections accounted for 13% of references included in BRT and this is likely to be reflected in a high percentage of photocopy requests for items in these sections.

It should also be noted that three of the regular users of the photocopy service are wood preservation firms and two of these firms have no library facilities. The second highest percentage of document requests - 8.5% - covered items in the Marine Fouling section and other BRT sections where large groups of documents were requested were Fuels and Hydrocarbons, Metals, Water Supply Systems and Micro-organisms. The above six sections accounted for 49% of BRT photocopy requests suggesting an intensive use of BRT and of the photocopy service.

4.2% of the documents requested were non-English language documents and the large majority of these were requested by overseas users, and in view of the BRT reference composition by medium of publication given in Chapter 5 it is interesting to note the type of documents requested:-

Photocopies requested 1974/75

Medium of Publication	% of Total Photocopy Requests	% of items in BRT 1975
Journal Articles	64%	61.7%
Conference/Symposium Proceedings	16%	15.3%
Reports/Tech Notes/News Items	14%	9.2%
Patents/Standards	5%	14 %
Books	1%	2.8%
Others	0.1%	
	----- @100% -----	

7.8 The Finance of the Enquiry Service and its relationship with the other Services of the BIC.

Enquiry numbers for 1974/1975 and previous figures for 1972/1973 show that only two enquiries are being dealt with per week. Not only are enquiry numbers relatively small but only a small number of enquiries are actually charged for: in 1974/75 only 14% were charged for a search, another 85% were asked to pay for photocopies and 51% did not incur any charges. The relatively low usage coupled with the apparently low income producing capabilities of the enquiry service might suggest that it uses up significant capital and human resources while producing little revenue for the BIC.

Income from the enquiry service represents only 2% of the total income of the BIC so are too many resources being committed to the maintenance of the service?

Regarding staff time, Section 7.5.6 of this chapter contains figures estimating that only seven and a quarter man days per year are spent on enquiries and in no sense could this figure be considered excessive. The other major resource supporting the service is the document collection and although it is not used extensively in enquiry answering it must be noted that the collection does not exist to purely support the enquiry service: the collections usefulness can only be judged in terms of its value as a provider of raw material for the journals, as a back-up to the research and contract service and as a support to the general research and teaching functions within the university as well as its use in the enquiry service. Given that the document collec-

tion is involved in all these BIC activities then the amount spent on document purchase during 1974/75 would appear to be a relatively small amount.

More importantly, however, it would be unfair to consider the usefulness of the enquiry service purely in terms of its income and expenditure, as the enquiry service has a role within the range of BIC activities which goes beyond these figures. This role is best explained with reference to non-subscriber enquirers: most of these enquirers will be using the BIC for the first time and the enquiry service can provide the contact point between these users and the other services offered by the BIC such as the regular publications or the contract research service.

The value of the enquiry service as a link between a user and other BIC services is shown particularly well in the relationship between the enquiry service and the contract research service. Between August 1974 and July 1975 £22,178 was generated by the research work of the BIC resulting from nine research contracts from industry in the United Kingdom. The subjects of the contracts included waste treatment and upgrading (reflecting the BIC's growing interest in this area), water quality in plastic cisterns, glass fibre breakdown, timber attack and preservative evaluation.

It has already been stated that the contract research service has, in recent years, become an increasingly important part of the BIC's activities and it is interesting to note that the enquiry service has been involved in this

expansion of research activities: five of the nine organisations providing research contracts had previously used the enquiry service. Three of the five organisations had used the enquiry service prior to 1974 and were initially given an answer by a subject specialist but then had requested some laboratory test work. Therefore, 55% of the contract research work undertaken during 1974/75 could be attributed, either directly or indirectly, to the previous use of the enquiry service.

Similarly, on a smaller scale, eleven of the 145 enquirers to the BIC during 1974/75 took out a subscription to the BIC's journals representing another source of regular income for the BIC: six users took out subscriptions to IBR and BRT while five users subscribed to WMB.

7.9 Conclusions

The detailed studies of BIC enquiries from 1972 to 1975 produces the following general observations:-

- (a) in the 1970's enquiry numbers have stabilised just below the 100 mark.
 - (b) the majority of enquiries have come from the UK and from industrial firms.
 - (c) there has been a roughly 50-50 split between subscriber and non-subscriber enquiries.
 - (d) the majority of enquiries have been the "study/research" type although there has also been a substantial group of "practical problem" enquiries.
 - (e) A number of answer forms have been used to answer enquiries and 50% of enquiries have been answered within a week.
- and
- (f) few enquiries have been charged for.

The levelling off of enquiries after six years of BIC development was to be expected given the growth of expertise in biodeterioration and the increasing use of the BIC's journals to provide information, both for current awareness purposes and retrospectively. However, the fall in enquiry numbers seems to have been accompanied by a

change in the nature of enquiries received: compared to earlier enquiries post 1970 enquiries are generally more complex and technical suggesting the need for more analytical answers.

The likelihood of a localised base to the enquiry service assuming that many potential enquiries are dealt with in individual countries, has been mentioned in this chapter and as 50% of enquiries have come from non-subscribers the enquiry service can act as a useful advertising medium and image maker for the BIC. The service is often the first point of contact for new users and has the potential to attract new and occasional users to other BIC services. For instance, a large number of non-subscriber enquiries have come from industrial firms with practical biodeterioration problems and the nature of these enquiries again emphasizes the importance of subject specialists to the BIC's activities: problems can be discussed verbally with a dialogue developing between the user and the information system while authoritative answers can be given in a variety of forms ranging from a telephone conversation through to a laboratory evaluation, if necessary.

The referral sources for non-subscriber enquiries have also shown the importance of the scientific community to the BIC's activities since a large number of enquiries have been referred to the BIC by working scientists. Another group of enquiries have also discovered the BIC through the publishing and general information exchange activities of scientists at the BIC.

The availability of subject specialists at the BIC. and, to some extent, the nature of the enquiries received have reduced the importance of the document collection as a direct source of an enquiry answer. The telephone, for instance, has been used to answer enquiries in almost as many instances as the document collection with the telephone being particularly evident in answering urgent enquiries requiring quick answers.

The relatively low use of the document collection might imply that resources are wasted on its maintenance but this chapter has emphasized the multiple role of the collection as a facility for the enquiry, photocopy, journals and research services. In this context, therefore, the resources spent on the collection appear to be relatively well employed although a small criticism relates to the absence of adequate indexes to effectively exploit the collection.

The small amount of literature searches carried out to answer enquiries has also reduced the income available from the service but, in a wider perspective, the importance of the enquiry service is not its own direct income producing capabilities but its ability to link a user with other BIC. services. For instance, previous users of the enquiry service have returned to the BIC. and provided income for the contract research services and journals accounts.

Therefore, at its present level, any changes in the charging policy of the enquiry service are unlikely to increase drastically BIC. income but any future changes should

attempt to increase this link between the service and other BIC. services and attempt to use further the subject expertise of the BIC.

The use patterns detailed in this chapter have shown that enquiries are being received from non-subscriber firms requiring information or advice to solve practical problems. These firms often lack scientific expertise or library facilities. Therefore, the BIC. could arrange informal workshops and seminars for these types of firms, perhaps in a small local area, to discuss their problems and provide advice and organisations such as the 'Small Firms Information Centres' could be possible co-operators in these activities.

Finally, there is the possibility, mentioned in the previous chapter, of developing a regular reviewing function at the BIC. Reviews in popular subject areas, such as those covered at present by the BIC's specialised bibliographies, could be a useful source of income, could strengthen the relationships between research and information at the BIC. and could increase the BIC.'s importance as a catalyst in the overall development of the subject of biodeterioration. Review compilation is time consuming but the existence of groups of research students, BIC. staff and external working scientists generally sympathetic to the BIC activities offer opportunities for review compilations to be undertaken as part of the general information gathering activities of individual workers.

Chapter 8The Potential for Future Growth in BIC. use

8.1 Introduction

8.2 Growth Patterns of the BIC.'s Information Services.

8.3 Potential Use of BIC.

8.3.1. The Distribution of Biodeterioration Research and BIC. Subscribers

8.3.2. A Study of BIC. Potential User Groups.

8.4 Future Growth of the BIC.'s Information Services

8.5 Conclusions

8.1 Introduction

The use patterns of the BIC's information services, described in the three previous chapters, offer some encouragement for the future stability of the BIC: although use patterns varied, the general view was that the BIC was offering a useful information service and there was little indication that large numbers of subscribers were about to cancel their subscriptions, despite inflation and budgetary limitations.

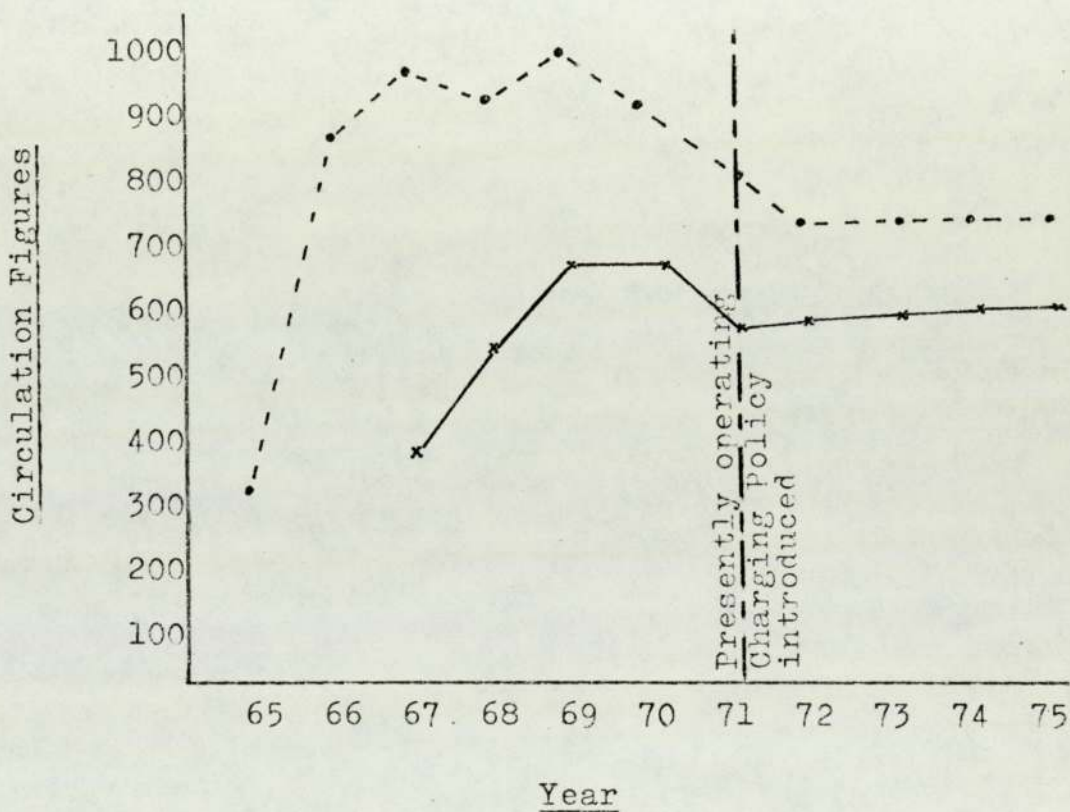
This chapter considers the possible future role and development of the BIC by bringing together some of the points made by users, by examining again the general distribution of biodeterioration research (described in Chapter 3) and by referring to comments made by a sample of potential BIC users: these potential users include biodeterioration authors, Biodeterioration Society members and non-subscriber enquirers to the BIC.

The problem for a small-scale information service is that the market for the services products is relatively small and this is reflected in the recent stabilisation in the growth of the BIC's information services described in the following section.

8.2 Growth Patterns of the BIC's Information Services

The following graph outlines the growth rates of subscriptions to IBB and BRT respectively from 1965 to 1975.

Circulation Figures for IBB/BRT, 1965-1975



- IBB (started publication 1965)
- x-----x BRT (started publication 1967)

The graph shows quite clearly the early growth in the circulation of the two journals: there were considerable fluctuations in IBB circulation up to 1971, but, after the introduction of an extensive charging policy in 1971, circulation figures for both journals fell and actual circulation figures have changed very little since. In percentage

terms the growth rate in subscriptions since 1971 has been as follows:-

	<u>Percentage Increases on Previous Year's</u>			
	<u>Circulation</u>			
	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>
IBB	-1.3%	+1.4%	+1.3%	+0.6%
BRT	0%	+1.8%	+1.3%	+1.2%

Growth rates over the last three years have generally been between 1% and 1.5% and it is encouraging that, after ten years of BIC development, there is still a positive growth in the circulation figures.

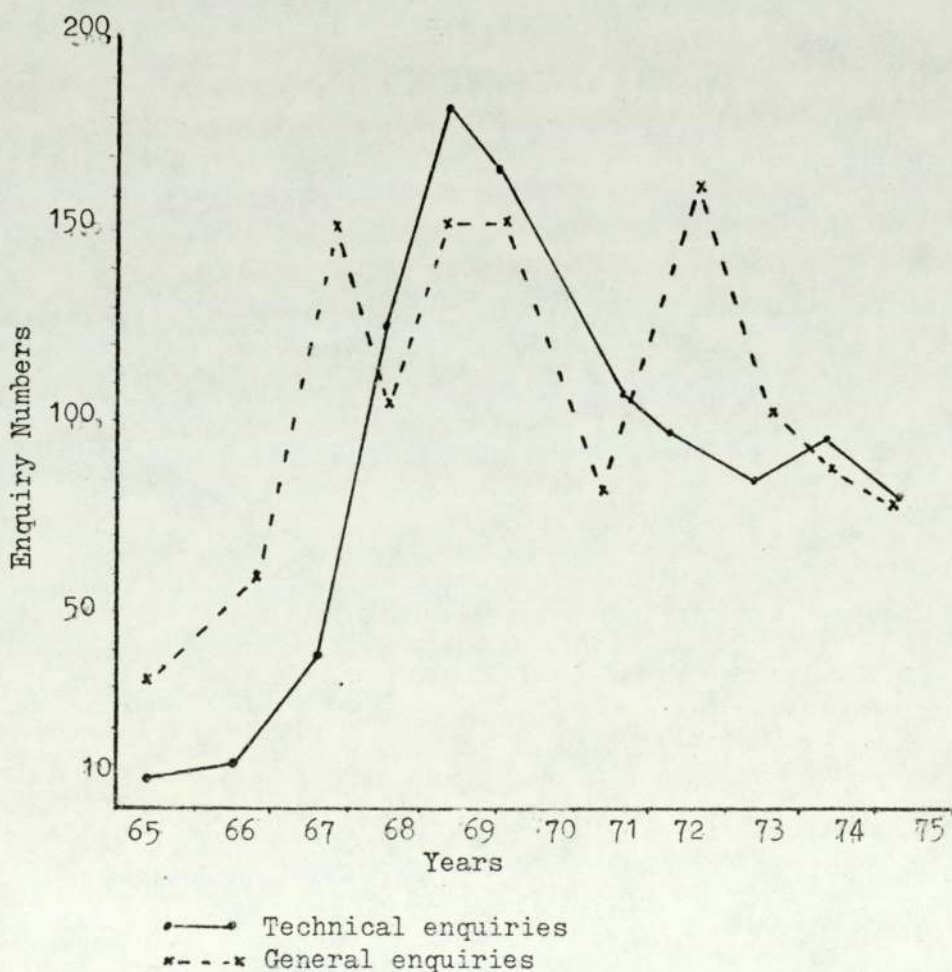
A new journal also appeared in 1974, Waste Materials Biodegradation Research Titles and although it has not been studied in detail in this project, it is worth noting that it has already added another 235 subscribers to the BIC. The subscription figures for its first three years are as follows:-

	<u>Waste Materials Biodegradation Research Titles</u>	
	<u>Subscriptions</u>	
	<u>Subscriber Nos.</u>	<u>% growth on previous year</u>
1974	110	-
1975	210	90%
1976	235	12%

Therefore, the creation of new journals can increase a centre's user numbers but, in terms of the future, it must be noted that the percentage growth in subscriber numbers has already fallen considerably from 1975 to 1976 so a significant increase in subscribers to this journal is unlikely in the years to come.

Technical enquiry numbers have also stabilised over the last few years to around the 100 mark and a similar pattern has emerged with general enquiries on the B.I.C.'s services:-

Technical and General Enquiry Numbers to B.I.C. 1965-1975



General enquiry numbers have been particularly erratic over the years but even these have stabilised over the last few years as the BIC. becomes widely known.

It appears that the only BIC. service which is expanding considerably is the contract research service: it became a regular feature of BIC. activity in 1972, increased its activities in 1973 and 1974 and by 1975, a member of staff was given the responsibility of organising the work in view of the increased demand on the service. (See Section 7.8).

It seems likely that contract research work will be the major growth point of the BIC. in future and this would be a natural extension of the BIC.'s activities: the service generates a considerable slice of the BIC.'s income and could support the other services; contract work is an extension of the BIC.'s information services which in turn can channel users to the contract service; and the development of contract work enables the BIC. to fulfil its duty to industry as part of a technological university.

Coupled to this growth in the contract service is the likelihood that the other information services will maintain user numbers at approximately the 1975 level. This observation is based on replies from users which suggested that they were generally happy with service output. However, there is still the question of whether the present user level is the optimum or whether there are significant groups of potential users which are failing to patronise

the BIC.'s services for one reason or another: this question is considered in the following section.

8.3 Potential Use of BIC.

8.3.1 The Distribution of Biodeterioration Research and BIC. Subscribers

Anyone involved, directly or indirectly, in the production of goods is a potential user of BIC. However, this section attempts to identify more specific potential user groups and to assess how far this potential could be turned into actual use. First, a comparison between the distribution of the study of biodeterioration and the distribution of subscribers to the BIC. will help to identify any major geographical gaps in BIC. use.

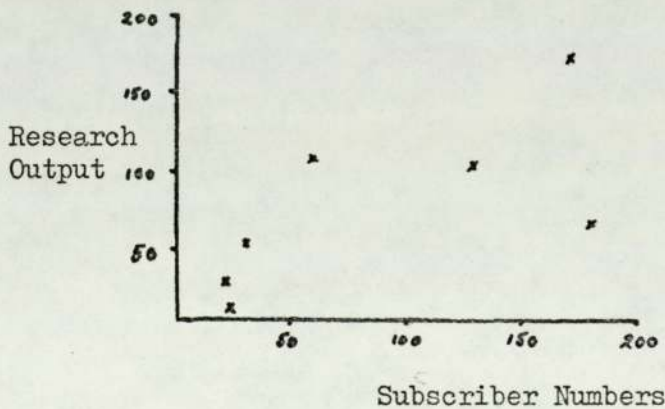
In Chapter 3, Figure 2 outlined the geographical origin of references included in the 1975 issues of BRT and Figure 13 in Chapter 4 showed a similar geographical distribution of subscribers to BRT and LBB: a comparison of these two distributions will provide a general view of the size of the BIC.'s market and the BIC.'s market penetration although the comparison requires certain assumptions to be made: first, it must be assumed that the 1975 reference distribution in BRT is typical of other years and examination of previous BRT.'s supports this assumption; second, if BRT is being used to measure the geographical distribution of the study of biodeterioration then it must be accepted that BRT has a relatively comprehensive coverage; and thirdly, it must be remembered that the majority of items in BRT are articles or reports describing research work - therefore, BRT. will underestimate, to some extent,

the extent of biodeterioration work as there will be workers who do not want to or are unable to publish.

Given these assumptions, the figures in Figures 2 and 13 can be retabulated to provide the following general relationship:

<u>Geographical Area</u>	<u>Research Output</u> (no. of insts. engaged in research)	<u>Subscriber Numbers</u>
North America	187	179
United Kingdom	77	196
W. Europe	106	148
E. Europe	51	31
Australia/N. Zealand	28	34
Developing Countries	124	72
Japan	29	15

The geographical divisions are arbitrary but if the figures are plotted on a graph some correlation exists:



The actual correlation coefficient is only 0.06 suggesting a negligible relationship (full details of the calculation method are given in Appendix 2). However, if the U.K. figures are omitted from the calculation a correlation coefficient of 0.69 is produced for the remaining figures: this represents a moderate correlation and suggests a substantial relationship exists between the two sets of figures.

Considering specific countries , the following two tables compare the number of references originating in individual countries and subscribers in these countries and the number of institutions housing authors of references in each country and the number of subscribers in each country.

Column A in Figures 40 and 41 represents the percentages of research output produced in each country during 1975, according to reference numbers in BRT, and Column B is the percentage of RLC subscribers in each country. Column C presents the result of $A - B$ and where this result is positive it suggests that research output is relatively higher than subscriber numbers and that there may be potential for RLC growth.

Countries where subscriber percentages are noticeably lower than research output percentages are shown by ringed figures in Column C of the two tables.

Generally, the comparison of research output and subscriber numbers suggests that RLC subscriptions have reached a relatively high level in most countries. In the U.K., for instance, subscription figures are significantly higher than research output figures: a reflection of the fact that in the U.K. the RLC has been able to reach a variety of users, including those with no apparent research interests.

Figure 40

Number of references originating in individual countries compared to subscribers(1975)

Country	$\frac{A}{\% \text{ of refs}}$	$\frac{B}{\% \text{ of subs}}$	$\frac{C}{A-B}$	Country	$\frac{A}{\% \text{ of refs}}$	$\frac{B}{\% \text{ of subs}}$	$\frac{C}{A-B}$
U.S.A.	32.2	22.9	+ 9.3	Eire	0.2	0.4	- 0.2
U.K.	16.2	27.9	-11.7	Bangladesh	0.19	0.0	+ 0.19*
India	8.7	3.5	+ 5.2	Rhodesia	0.19	0.1	+ 0.09
Japan	5.2	2.1	+ 3.1	Malaysia	0.19	0.5	+ 0.04
W.Germany	4.5	3.4	+ 1.1	China	0.19	0.4	+ 0.21
U.S.S.R.	3.4	1.7	+ 1.7	Brazil	0.19	0.5	- 0.31
Canada	2.9	2.5	+ 0.4	Philippines	0.19	0.0	+ 0.19*
Israel	2.8	0.9	+ 1.9	Thailand	0.19	0.2	- 0.01
Australia	2.4	4.5	- 2.1	Kenya	0.1	0.0	+ 0.1*
Egypt	2.1	0.0	+ 2.1*	Ghana	0.1	0.4	- 0.3
Sweden	1.8	1.4	+ 0.4	Spain	0.1	0.8	- 0.7
Rumania	1.7	0.5	+ 1.2	Indonesia	0.1	0.0	+ 0.1*
France	1.5	3.9	- 2.4	Bulgaria	0.1	0.0	+ 0.1*
Poland	1.5	0.9	+ 0.6	Yugoslavia	0.1	0.1	0.0
Nigeria	1.1	0.9	+ 0.2	Iraq	0.1	0.0	+ 0.1*
N.Zealand	0.9	1.7	- 0.8	New Guinea	0.1	0.0	+ 0.1*
Italy	0.9	2.1	- 1.2	Sri Lanka	0.06	0.1	- 0.04
Denmark	0.9	0.8	+ 0.1	Tanzania	0.06	0.0	+ 0.06*
Netherlands	0.8	3.2	- 2.4	Portugal	0.06	0.2	- 0.14
Czeckoslovak.	0.6	0.7	- 0.1	Zambia	0.06	0.1	- 0.04
Norway	0.5	0.5	0.0	Sierra Leone	0.06	0.0	+ 0.06*
Finland	0.5	0.7	- 0.2	Kashmir	0.06	0.0	+ 0.06*
Austria	0.4	0.14	+ 0.26	Senegal	0.06	0.0	+ 0.06*
Switzerland	0.3	1.2	- 0.9	Sudan	0.06	0.0	+ 0.06*
E.Germany	0.3	0.0	+ 0.3*	Singapore	0.06	0.5	- 0.44
S.Africa	0.2	1.1	- 0.9	Turkey	0.06	0.2	- 0.14
Belgium	0.2	1.5	- 1.3	Argentina	0.06	0.1	- 0.04
Pakistan	0.2	0.14	- 0.06	Puerto Rico	0.06	0.0	+ 0.06*
Hungary	0.2	0.2	0.0	Paraguay	0.06	0.0	+ 0.06*

* COUNTRIES WITH NO B.I.C. SUBSCRIBERS

refs - REFERENCES
subs - SUBSCRIBERS

Figure 41

Number of institutions providing references in individual countries compared to the number of subscribing institutions (1975)

Country	A	B	C	Country	A	B	C
	%of insts	%of subs	A-B		%of insts	%of subs	A-B
U.S.A.	26.7	22.9	+ 3.8	Eire	0.4	0.4	+ 0.0
U.K.	12.6	27.9	-15.3	Bangladesh	0.4	0.0	+ 0.4*
India	11.3	3.5	+ 7.8	Rhodesia	0.4	0.1	+ 0.3
Japan	4.7	2.1	+ 2.6	Malaysia	0.4	0.5	- 0.1
W.Germany	5.7	3.4	+ 2.3	China	0.4	0.4	0.0
U.S.S.R.	1.6	1.7	- 0.1	Brazil	0.4	0.5	- 0.1
Canada	3.9	2.5	+ 1.4	Philippines	0.4	0.0	+ 0.4*
Israel	1.1	0.9	+ 0.2	Thailand	0.4	0.2	+ 0.2
Australia	3.4	4.5	- 1.1	Kenya	0.4	0.0	+ 0.4*
Egypt	0.6	0.0	+ 0.6*	Ghana	0.4	0.4	0.0
Sweden	1.9	1.4	+ 0.5	Spain	0.1	0.8	- 0.7
Rumania	0.8	0.5	+ 0.3	Indonesia	0.4	0.0	+ 0.4*
France	2.2	3.9	- 1.7	Bulgaria	0.1	0.0	+ 0.1*
Poland	1.8	0.9	+ 0.9	Yugoslavia	0.1	0.1	0.0
Nigeria	1.3	0.9	+ 0.4	Iraq	0.4	0.0	+ 0.4*
N.Zealand	1.1	1.7	- 0.6	New Guinea	0.1	0.0	+ 0.1*
Italy	1.4	2.1	- 0.7	Sri Lanka	0.1	0.1	0.0
Denmark	1.4	0.8	+ 0.6	Tanzania	0.1	0.0	+ 0.1*
Netherlands	1.3	3.2	- 1.9	Portugal	0.1	0.2	- 0.1
Czechoslovak.	1.4	0.7	+ 0.7	Zambia	0.1	0.1	0.0
Norway	0.9	0.5	+ 0.4	Sierra Leone	0.1	0.0	+ 0.1*
Finland	0.3	0.7	- 0.4	Kashmir	0.1	0.0	+ 0.1*
Austria	0.4	0.14	+ 0.26	Senegal	0.1	0.0	+ 0.1*
Switzerland	0.8	1.2	- 0.6	Sudan	0.1	0.0	+ 0.1*
E.Germany	0.4	0.0	+ 0.4*	Singapore	0.1	0.5	- 0.4
S. Africa	0.6	1.1	- 0.5	Turkey	0.1	0.2	- 0.1
Belgium	0.4	1.5	- 1.1	Argentina	0.1	0.1	0.0
Pakistan	0.4	0.14	+ 0.26	Puerto Rico	0.1	0.0	+ 0.1*
Hungary	0.6	0.2	+ 0.4	Paraguay	0.1	0.0	+ 0.1*

* COUNTRIES WITH NO B.I.C. SUBSCRIBERS

insts - REFERENCE PROVIDING INSTITUTIONS
Subs - SUBSCRIBING INSTITUTIONS

In Figure 40 ringed figures in Column C show that subscribers are particularly low in the U.S.A., India, Japan and Egypt, where the divergence between subscribers and research output is greater than 2%, and in West Germany, Rumania, U.S.S.R. and Israel, the divergence is between 1% and 2%. The percentage number of 1975 references corresponding to each country in 1975 is approximately the same as in previous years and this suggests that, generally, subscriptions in the above named countries are low relative to research output.

Unfortunately, it is difficult to test the statistical significance of the percentage differences in Column C of Table 40 and, therefore, only broad observations can be made: these observations suggest that the B.I.C. might have expected to obtain more subscribers in the U.S.A., India and Japan, in particular, than the numbers at present.

An examination of Column C in Table 41 shows that in India there is a large gap of 7.8% between subscriber organisations and reference producing organisations. In numerical terms, this represents between forty and fifty institutions which do not subscribe to the B.I.C. but which have an interest in biodeterioration. In practice, this figure will be larger as the figures in Table 41 covers only 1975 and cover institutions which have published material.

In three other major reference producing countries - U.S.A., Japan and West Germany - subscribers lag

some way behind reference producing organisations but in these countries the difference is not particularly large: numerically, it is only five or six institutions in the U.S.A. and between ten and twenty institutions in Japan and West Germany. Therefore, India emerges as the one major reference producing country where a significant group of institutions have failed to subscribe to the BIC. Foreign exchange difficulties are likely to affect the number of subscribers able to pay for the BIC's services in India while these difficulties are less evident in the other countries mentioned above.

The other point concerns those countries marked * in the two tables. These countries have an interest in bio-deterioration, reflected by reference output in 1975, but the BIC lacks subscribers in these countries. These countries are: Egypt, Bangladesh, Philippines, Bulgaria, Kenya, Indonesia, Iraq, New Guinea, Tanzania, Sierra Leone, Kashmir, Senegal, Sudan, Puerto Rico and Paraguay. Bulgaria apart, the countries have one common characteristic in that they are all classed as "developing countries". When the above list of countries is added to the underutilisation of the BIC in India, it suggests that the developing countries could offer the greatest potential for the future development of the BIC.

Theoretically this growth in use in the developing countries would be desirable for a number of reasons: first, problems of biodeterioration are particularly evident in tropical developing countries; secondly, the development of

services for developing countries is compatible with the prevailing views of international organisations, such as UNISIST and UNIDO, which are establishing programmes to reduce the gulf separating the information resources of developed and developing countries; thirdly, it increases the market for RIC; and fourthly, the development of a subscriber network in developing countries may also offer the opportunity for more references and articles to be received as input to the RIC from these countries.

On a practical level there are limitations which make the developing countries less attractive as a market. There is the cost problem demonstrated more specifically in the following section: financial restrictions would mean that many subscribers would be unable to afford the BIC's services. There is also the problem that a service produced in a western industrialised country may not be suitable for the requirements of a developing country. A completely different service may be required to deal with the special problems of developing countries. Related to the above point is the problem of trying to assess user needs and requirements in developing countries which are geographically distant from the information source and which usually possess different economic, cultural and social systems: this problem is reflected in this survey which obtained a very poor response from the developing countries in the sample.

Nevertheless, comparative figures in Tables 40 and 41 point to the developing countries as the major growth area for future RIC service developments. A number of organi-

sations in certain developing countries subscribe already but it would be interesting to examine the needs of potential users in these areas; to investigate the potential for a specific type of service aimed at these countries; and to consider the possibility of establishing a network of small centres in these countries, either linked to the BIC. in the U.K. or linked to each other with a central collecting point in certain areas.

This question of developing countries' information needs could be an area for future investigation and a tailored biodeterioration service could become particularly attractive if individuals in the developing countries could be persuaded to co-operate and act as co-ordinators of the information service in a particular country: they could provide the link with the BIC. or a central collecting unit and would obtain the information services output for distribution. These individuals could also play a useful part in channelling relevant references from the developing countries to the BIC. or some other central unit. There is an obvious parallel here with the Co-operating Specialists scheme used earlier by the BIC. to collect references (Eggins and Willsher 1970) except that in this instance the co-operating individuals or organisations would be receiving a much more specific service in return and would probably have some control over the output of the service.

8.3.2. A Study of BIC Potential User Groups

A more specific study of the potential use of BIC services covers various groups of potential users who have expressed some interest, by their actions, in the subject of biodeterioration:-

Non-Subscriber authors cited in BRT (1975)

The first group of potential users are authors who had their publications included in BRT during 1975. There were 988 first authors in 1975 (see Figure 3) and 169 of these were non-subscribers - neither the authors as individuals nor their host institutions subscribed.

When non-subscriber authors are included in BRT a publicity card is sent to them asking if they would like to obtain details of the BIC's services and specimen copies of the BIC's journals. 118 non-subscriber authors asked for the above details and specimens and these represented a recognisable group which became the study sample: approximately six weeks after the mailing of the publicity card a postal questionnaire was sent to those authors who were still non-subscribers to obtain information on their reasons for not subscribing. The questionnaire is included as Figure 42 and it was kept simple to facilitate a quick reply. Of the 118 authors who had asked for information and specimen copies from BIC only one had taken out a subscription after the six week period so the questionnaire was sent to the remaining 117 authors and the response rate

Figure 42Questions asked to non-subscribing authors of references cited in BRT

1. Name of respondent?
2. Institution of Employment?
3. Position in Institution?
4. Nature of interest in subject, Biodeterioration?
(i.e. researching in subject, related subject, lecturer,
practitioner, librarian etc. -please specify).
5. Reason (s) for not subscribing to B.I.C.'s publications?
(i.e. subject coverage not relevant, other sources used,
cost of publications, time lag, presentation, other
reason (s) -please specify).
6. Any other comments?

was 61.5% (72 replies were received).

The table below gives the basic geographical distribution of the respondents:-

Geographical Origin of Respondents from Author

Sample

<u>Area</u>	<u>% of respondents</u>
United Kingdom	15.3%
North America	38.8%
Europe	29.2%
Elsewhere	16.7%

The reasons given for non-subscription are tabulated below:-

Reasons given by author sample for not subscribing to BIC. Services

<u>Reason</u>	<u>% of respondents</u>
1. Biodeterioration only of peripheral interest	36%
2. Cost of Services	26%
3. Other Information Services adequate	25%
4. BIC publications available in institution's library	8%
5. Considering subscription	3%
6. Author interested but insufficient demand in author's institution	3%
7. Lack of space	2.5%

8. Information requirements very specific 3%
9. B.I.C. Publications available in nearby library 2.5%

* total percentage more than 100% as 4 respondents gave more than one reason (ie 4 gave reasons (1) and (2))

The four major responses can be retabulated to show the type of replies received from different geographical areas:-

Geographical Area Major Factors preventing subscriptions and % of replies from each area

	(1) Only of peripheral interest	(2) Cost of Services	(3) Other Service adequate	(4)* Bic Services available in respondents institution
United Kingdom	36.3%	27.2%	18%	18%
North America	35.7%	14.2%	32%	10%
Europe (exclu. UK)	38%	14.2%	28.5%	4.7%
Rest of World	33%	66%	8.3%	-

* After asking for specimen copies, respondents in this section discovered that their organisation already subscribed to the B.I.C..

The primary reason given for non-subscription was that the study of biodeterioration was only of peripheral inter-

est and this suggests that, at any time, there may be a 'floating' group of authors who are essentially working in a related area but who may occasionally contribute to the biodeterioration field. These authors may be studying biodeterioration problems as an offshoot of, or parallel to, a related study or may publish general work which indirectly has relevance to biodeterioration problems: the latter is particularly likely since a number of references cited in BRT cover such things as the general behaviour patterns of organisms, toxins in foods and other health related problems and general techniques.

The second most popular reply was that the cost of the BIC. information services prohibited subscribing. It is probable that the cost factor is allied closely to the fact that for many respondents the services were only of peripheral interest although only four respondents stated both reasons explicitly.

Concern over the cost of the BIC.'s services was particularly evident in areas outside Europe and North America and over 50% of the replies came from developing countries. Therefore, the obvious conclusion is that any potential for growth in BIC. use in the developing countries, discussed in the previous section, is likely to be severely constrained by budgetary limitations in these countries.

The third major reason given was that other information services were adequate: again, this reason inter-relates with the peripheral interest and cost reasons

although none of the respondents actually noted the link in their replies. The largest group of respondents stating this reason were located in the U.S.A. and the most common service used appears to be Current Contents. The suggestion that a service such as Current Contents, is sufficient for a person's information needs has far reaching implications for services such as those provided by BIC which cover all types of publication form and try to be as comprehensive as possible. Current Contents only provides the titles of articles from a select group of periodicals yet the indications are that this is sufficient for some users. The implication is that, for these users, an all-embracing service is not necessary. Another explanation might be that these respondents were unaware of the range of coverage of the BIC services although as this is covered by the publicity material sent to these respondents this explanation seems unlikely.

The fourth reason is an interesting example of the organisational difficulties in many institutions and it does not strictly represent a reason for not subscribing. The respondents who fall into this group found out, after they had requested and received the BIC's publicity material, that the organisation in which they worked already subscribed to the BIC, either through the organisation's library or through another department. In the United Kingdom, 18% of respondents discovered this and in North America the figure was 10%. These figures indicate that there are likely to be many organisations where the services of the BIC are underutilised and where the BIC services

become lost in the organisational structure.

The other responses noted were provided by only eight respondents so the four reasons described above cover over 95% of the replies and the general picture suggests that, with these potential users, there is little scope to increase subscriber numbers.

Biodeterioration Society Members

Biodeterioration Society members are another group who have a direct interest in the subject of biodeterioration and who are likely to subscribe to the BIC's services, particularly as they can obtain a reduced rate subscription. An examination of the subscription patterns of Biodeterioration Society members in 1975 confirmed that 213 of the 241 did subscribe to the BIC's service and the remaining 28 members were sent a questionnaire (See Figure 43) to discover their reasons for not subscribing.. Twenty replies were received representing a response rate of 71.4% and their stated reasons fall into three main categories:-

Reasons for not subscribing to BIC Services given by Sample of Biodeterioration Society Members

<u>Reason</u>	<u>% of respondents giving reason</u>
1. Cost of Services	50%
2. No longer directly involved in biodeterioration work	30%
3. Unaware of BIC Services	20%

Figure 43Questions asked to non-subscribing Biodeterioration Society members

1. Name of respondent?
2. Institution of employment?
3. Position in institution?
4. Nature of interest in subject, Biodeterioration?
(i.e. researching in subject, related subject, lecturer,
practitioner, librarian etc. -please specify).
5. Are you, or is your institution, a subscriber to any of the
B.I.C.'s publications?
6. If answer NO to question 5 please give reason (s) for
not subscribing to B.I.C.'s publications?
(i.e. subject coverage not relevant, other sources used,
unaware of publications, cost of publications, time lag,
presentation, other reason(s) -please specify).
7. Any other comments?

The fact that the cost of the services is a limiting factor to 50% of the respondents is surprising as reduced rates are available. Respondents in this category came from Europe, U.S.A., Australia, West Germany and Japan so cost limitations cannot be attributed to any one country.

A more logical explanation for not subscribing is that some society members are no longer involved in bio-deterioration studies and 30% of the sample provided this response. These members may have forgotten to cancel their Society membership or may be maintaining their membership because of their general interest in the subject and in either instance, it is unlikely that they would require the services of BIC.

The third reason mentioned showed that certain respondents were unaware of the services offered by the BIC and the range of services offered. Again, this is a little surprising as all new members to the Biodeterioration Society also receive details of the BIC's activities. Nevertheless, one or two of these respondents are now considering taking out a subscription to the BIC so a small increase in BIC subscriptions and awareness might occur. In general, however, the survey of Biodeterioration Society members suggests that there is little scope for increasing BIC use in this area.

Non-subscriber technical enquiries (1974/1975)

Between January 1974 and August 1975, 50% of the

enquiries received at the BIC. came from non-subscribers, 145 enquiries were dealt with during this period and seventy-two came from non-subscribers and 75% of these came from the U.K., (See Section 7.5.4). A questionnaire was sent to sixty-one of these enquirers; two weeks after they had received an answer from the BIC., to discover whether they were likely to take out a regular subscription and, if not, why not: the eleven enquirers not in the sample were householders and, therefore, not likely to be in the market for a subscription. Unfortunately, the response rate was only 33%, in numerical terms, 20 respondents, despite a follow up letter three weeks after the original mailing.

* Included as part of questionnaire in Figure 32.

Given that the response rate was poor only crude generalisations can be made from the type of responses given which are tabulated below:-

Reasons for not subscribing to BIC services given by sample of Non-subscribing enquirers (1974/1975)

<u>Reason</u>	<u>% of respondents giving this reason</u>
1. Study of Biodeterioration is only of peripheral interest	25%
2. Enquiry represented one-off enquiry therefore not worth subscribing regularly	30%
3. Other services adequate	10%
4. Cost	40%
5. Interested in Biodeterioration but nature of Service not suitable for needs	10%

‡ total percentage more than 100% as 3 respondents gave

more than one reason.

Again, the responses are interrelated but the general theme running through 90% of the responses is that their enquiries are one-off enquiries which are unlikely to occur again. For this reason, a regular subscription was not considered necessary and a number of respondents stated that it was enough to know of the existence of BIC, for future reference.

Details of the type of response given under each category are given below:-

Reasons (1) and (2) - Biodeterioration only of peripheral interest/enquiry represented one-off enquiry.

Most of these responses came from individuals in firms and miscellaneous organisations where a practical biodeterioration problem had occurred. The respondents stated that the problem was an isolated one and was unlikely to occur again so a subscription was not necessary. 10% of the 55% of respondents in these groups stated that they were unsure of the scope of the service when they had enquired and had discovered that it was not really of major relevance to their area of work..

Reason (3) - Other Services Adequate : Again, related to the fact that biodeterioration is a specialised subject: these respondents considered discipline orientated services to be adequate for their needs.

Reason (4) - Cost : answer given mainly by industrial firms and universities and colleges overseas.

Reason (5) - Interested in Biodeterioration but Services not suitable

10% (2 respondents) had some interest in biodeterioration: one respondent was a schoolteacher who included biodeterioration studies in her course but the BIC's services were too technical and costly for her needs; the other respondent was an industrial technician who felt that the BIC. publications were too research orientated for his requirements.

8.4 The Future Growth of the BIC.'s Information Services

The general picture that emerges from the studies described in the previous sections is that there is unlikely to be any significant increase in the number of subscribers or enquirers to the BIC, given the present service levels. The contract research service is likely to remain the major growth point.

However, there are wider aspects relating to the potential use of BIC. which have not been reflected in the survey of selective potential users: there may be geographical areas or industrial sectors where awareness of a new service like the BIC. is still limited; there may be people who are unaware that they have a biodeterioration problem; and there may be possibilities for developing new types of services concentrating on markets which were previously uninterested.

Regarding these points, the development of a regular reviewing function at the BIC. has already been suggested: staff members or commissioned individuals could contribute to a regular series of reviews. This would be a logical development for an information centre involved in the scientific community and staffed by working scientists but it is also unlikely that such a development would increase total user numbers by that many. Review publication would probably attract more income but the individuals and organisations using the BIC. already would be the main patrons of such a service.

More appropriately, for the economics of the BIC. and to increase the BIC's diversification, it may be desirable to utilise the practical experience gained by staff members at the BIC. and to develop new services associated with the growth in the contract research service. For instance, the investigation of non-subscriber enquiries (7.5.4) showed that many individuals in industry were working on biodeterioration problems, but had little expert knowledge of the problems. A regular service aimed at these people would be a new development for the BIC. but would be compatible with the aims of a technological university and would balance the research orientation of LBB. and BRT. The service might take one or more of the following forms: regular workshops or seminars for specific industries or for industries in a particular area; an informal newsletter offering advise on particular problems, news items, addresses of useful contacts, and a forum for the exchange of problems and views amongst its users; or a more selective service to individual firms and organisations.

All these possible services relate to the contract research and enquiry service at the BIC. but they would add an extra dimension to the BIC's activities at a time when it appears that its main published services have reached their optimum user level.

8.5 Conclusions

A number of authors have suggested that any information service is only likely to reach a small percentage of its potential market: Wiesman (1972) suggested a maximum of 50% of the market and Martyn (1970^a) a maximum of 20%. Another point is that user numbers are likely to fluctuate in the early years of a service's development but after a period will stabilise: this has happened with BIC. users and subscriber and enquiry figures have stabilised over the last few years.

With these points in mind, the survey of potential users suggests that a good market coverage has been obtained by the BIC. The comparison of the geographical distribution of authors of BRL references in 1975 and BIC. subscribers suggests that there are few areas where the BIC. has failed to reach a substantial part of the market: the exceptions to this seem to be India and certain other developing countries where more market penetration would be desirable not only from the economic point of view but because it would be compatible with the general aim of improving information provision in the developing countries.

The survey of certain groups of potential users also suggests that there is little scope for increasing use to any great extent: although many authors have contributed to the subject, biodeterioration, it is also a peripheral subject area for many of them; similarly, many of the non-subscriber technical enquirers are dealing with an occasional

problem and their interest in the subject does not warrant a regular subscription; and most Biodeterioration Society members are already BIC. subscribers.

Given this apparent stabilisation in the growth of subscribers to the BIC's journals and the likelihood that laboratory services will become an increasingly important part of the BIC's activities, the previous section of this chapter has tried to suggest that future growth requires a different type of service associated with the contract research work. This service would concentrate on providing practical help, in one form or another, to those individuals working in industry, and in particular small industries, on biodeterioration problems. Such a service would provide a broader base to all the BIC. information services; would hopefully benefit the BIC. in terms of increasing income, and improving staff expertise; and would benefit the university through increased income and through increased involvement with industry.

Chapter 9The Organisation and Activities of U.K. Specialised
Information Centres

- 9.1 Introduction
- 9.2 The National Context
- 9.3 The Establishment of SIC's in the U.K.
- 9.4 The Present Organisation and Activities
of SIC's in the U.K.
 - 9.4.1 Staffing
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 - 9.4.4 Finance
 - 9.4.5 Evaluation
- 9.5 A Note on U.S.A. SIC's
- 9.6 Conclusions

9.1 Introduction

As the BIC is one of a number of specialised information centres (SIC's) operating in the United Kingdom it would seem appropriate to provide a backcloth to the BIC. use patterns study by offering some indication as to what extent this study can provide information and guidance to other centre operators. To do this the fifth major hypothesis is examined: the hypothesis that the BIC's organisation, activities and use patterns are representative of SIC's generally. On a broader level, this chapter will also offer some observations on the general development of SIC's, identify any common characteristics amongst SIC's and examine the practical workings of SIC's in relation to the definitions of SIC's presented in Chapter 1 (Section 1.3). Some of the issues for consideration are:-

Location/Personnel - the BIC is staffed by working scientists and has strong links with the scientific community. Its location at a university provides benefits for the university and the BIC and enables the BIC to develop the three functions of information, education and research provision. These functions are compatible with the concept of SIC's but are they evident in other SIC's? Is there involvement with the scientific community? And what are the relationships between SIC's and their host institutions, if any?

Services - The BIC offers not only bibliographical services but also advisory and contract research and study

services. Is this a typical range of services offered by SIC.'s? Also, to what extent is the information analysis function, noted in most definitions, evident in the services offered by SIC.'s?

User Composition/Use Patterns - BIC. users largely originate from industrial and academic institutions and the centre serves a worldwide market. How far have SIC.'s developed international markets and what are the user compositions of and numbers of SIC.'s?

Finance - How are SIC.'s financed and are self-supporting SIC.'s feasible, or desirable?

Information on these issues was obtained by visiting twelve U.K. SIC.'s and although the time spent at each was relatively short enough information was collected to provide a general review of SIC. development in this country and the role of the BIC. in this development.

The services examined were:-

- * 1. Biodeterioration Information Centre, University of Aston
- * 2. Biomedical Engineering Information Service (Project FAIR), Clinical Research Centre, Harrow.
- * 3. Biomedical Information Service, Sheffield University.
- ✓ 4. Crystallographic Data Centre, Cambridge University.

- ✓ 5. Ergonomics Information Analysis Centre, Birmingham University.
- * 6. Information Centre on High Temperature Processes, Leeds University.
- 7. Marine Pollution Information Centre, Marine Biological Association, Plymouth.
- * 8. Mass Spectrometry Data Centre, U.K.A.E.A., Aldermaston.
- 9. National Documentation Centre for Sport, Physical Education and Recreation, Birmingham University.
- 10. Particle Science Information Service, Loughborough University.
- ✓ 11. Rock Mechanics Information Service, Imperial College, London.
- 12. Waste Management Information Centre, U.K.A.E.A., Harwell.

The survey has concentrated on U.K. centres (in Section 9.5 some general comparisons are made with the U.S.A.) because the BIC. is located in the U.K., because U.K. SICs exist within a common national framework and because, in the mid-sixties, there was a national 'pump-priming' programme initiated by OSTI which provided support for a group of SIC's: SICs marked * in the above list were those originally supported by OSTI for an experimental period beginning in 1965-1966 but other SICs marked ✓ also received OSTI support later in 1967-1968. Ten years on would seem an appropriate time to examine the general effects of this support both in terms of the SICs supported, its multiplier effect in creating other centres, and the results in terms of subse-

quent self-sufficiency.

The twelve centres were chosen because they represent the closest working examples of the definitions of SIC's given in Chapter 1: they all cover subjects in science and technology, and relate to multi-disciplinary subjects not adequately provided for by other services. Therefore, in the following sections, some of their characteristics are described and Figure 44 provides the summary information for this description.

9.2 The National Context

OSTI support in the 1960's marked the integration of SICs into a national U.K. information policy. OSTI supported eight centres, in some way, and the OSTI definition, stated in 1965, saw them developing into international centres for knowledge attracting experts who could write short articles or reviews, building up sponsored research and consultancy work and becoming training centres for young scientists in the effective use of information (DES 1971).

The OSTI definition was produced in a time of relative financial stability and before there was any real experience of SICs in this country but it remains the only indication of a national policy covering SICs and it is a useful focus for the following discussion (the full definition is quoted in Chapter 1, Section 3).

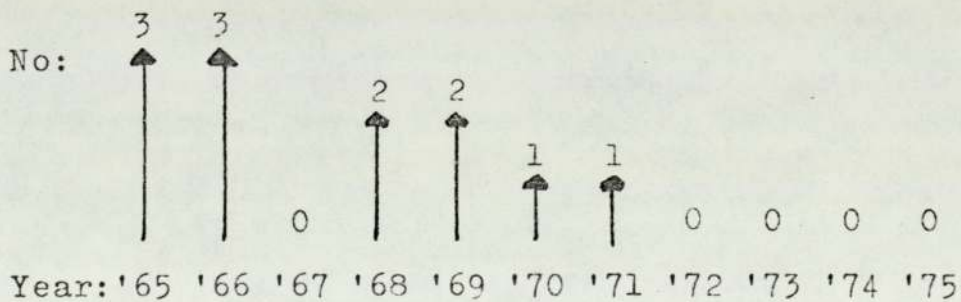
Active OSTI support for SICs ended in 1969 when a report was produced (Robertson and Reynolds, 1969) based on the experiences of the five SICs originally supported by OSTI. The report aimed to identify problem areas in the establishment and maintenance of SICs and was seen as a guide for future SIC operators. At the same time, an article by Eggins (1969) was outlining the potential for SICs in the U.K. :

"this country, being at a world communication crossroad, together with the advantage of its reputation for the dissemination of relatively

impartial information and also with its language advantage in regard to published material, is in a unique position to develop S.I.C.'s in a variety of fields it appears that a relatively small investment could easily establish this country as a leading disseminator of specialised information, with clear benefits primarily to this country, but also to the world as a whole".

Since the report and the article, however, only five new centres appear to have been established in six years compared with the establishment of eight centres between 1965 and 1968:-

Number of S.I.C.'s established from 1965 to 1975



The absence, since 1969, of any direct initiative from policy makers in the information community suggests that S.I.C.'s have arisen where scientists and technologists have expressed a need for a centre and where scientists and technologists have been able to operate such centres, although if requests for public funds have then been made to support these centres it is likely that the importance of that particular subject area within the whole frame-

work of information requirements will have to be considered: in this respect, the passive involvement of the British Library, Research and Development Department in SICs is reflected in the department's staff composition where a group of staff cover 'Information Analysis Centres' (British Library 1976).

The problem remains, however, that in the absence of any regular national impetus, an unco-ordinated development of SIC's might result with the disadvantages of subject overlap and, perhaps more importantly, the overlooking of subject areas where information provision is needed: an underdeveloped subject area, in terms of information provision and communication, may not possess an articulate group of specialists who can identify the need for an SIC so the subjects need will go unnoticed and the subject's development hindered.

The U.K. also lacks any co-ordinating body which can bring together the operators of individual SICs to discuss common problems and, to some extent, this lack of co-ordination is a reflection of the lack of co-operation between small scale services in general: the formation of the Aslib Information Industry Group (Aslib 1977) which will bring together representatives of various information services may go some way to alleviating this problem.

The minimal activity of bodies connected with SIC's should not imply, however, that interest in this area has waned. Recent documents by Gray and Perry (1975), UNISIST

(1975) and Woodward (1975) all emphasize the need for SIC's while Harvey (1976) has produced a general textbook outlining the philosophy and problems of SICs using practical examples.

Finally, the recent interest generated by UNISIST (UNISIST 1975) in SICs may provide an incentive for national organisations to review their policies on such centres. A UNISIST working group on Information Analysis Centres (IAC's) held its first meeting in 1975 and raised the following points: the costs of IACs necessitate operating in an international framework; different users require information analysed in different ways; the analysis function should be carried out by 'good, active scientists'; and policy makers in the developing countries should be convinced of the importance of IACs.

These points will be of particular interest with regard to the review of U.K. SIC activity to follow but, on a practical level, the centres are at varying stages of development so it will be obviously difficult to make direct comparisons between centres. Any observations made, therefore, on U.K. centres in the following sections will try to take account of their relative stages of growth.

9.3 The Establishment of Specialised Information Centres in the U.K.

Three common features, all of which are consistent with the definitions of SICs outlined earlier, were evident when U.K. SICs were established: the involvement of the scientific community, a location where research is undertaken and the use of a grant initially to support a centre.

Scientific Community

Like the RIC, the Mass Spectrometry Data Centre was also established following the recommendations of an international scientific group.

The majority of SICs, however, 'mushroomed' from an internal information service or from files kept by laboratory scientists thus reflecting the extent to which the day-to-day information gathering activities of researchers can develop into a viable external activity.

The Biomedical Engineering Information Centre, the Biomedical Information Service, the Rock Mechanics Information Service, the Waste Management Bureau and the Particle Science Information Service were all based on existing internal activities which had been carried out regularly for at least eight months before the inception of the centre. The Marine Pollution Information Centre also developed from an internal information collecting exercise but in this instance the exercise was generated by a single incident,

the Torry Canyon disaster, a marine oil-spill which happened in March 1967.

On another level, there are those centres not established directly through the activities of individual groups of scientists but established on the recommendations of national and international bodies: the Information Centre on High Temperature Processes was established on the advice of the Science Research Council and the National Sports Documentation Centre was established on the recommendation of the Sports Council.

With all but one centre, therefore, the initial idea for their development came from the scientific community. The odd man out is the Ergonomics Information Analysis Centre which was established after an enquiry into the need for such a service by OSTI, but even in this instance the service was a resurrection of a previous one compiled at the Warren Springs Laboratory and serving a limited number of scientists.

Location

Given the involvement of the scientific community, therefore, it is not surprising that all the centres have been established at locations where research in their subject is being carried out. Eight have been established within Universities, two in government research institutions, and two in other research institutions. These locations, therefore, suggest the possibility of symbiotic relationships

developing whereby centre staff contribute to the overall activities and continued development of the host institution and where the staff and resources of the host institution are utilised for the benefit of a centre.

Finance

The third common characteristic is that all centres, bar one, have depended on a grant for their initial development. The importance of financial assistance in the early stages of SIC. development is exemplified by the one centre, the Particle Science and Technology Information Service, which did not receive a grant: Harvey (1976) states that since its establishment it has been in financial difficulties and, as a result, it recently decided to accept a grant from Pergamon Press Ltd to secure its future.

The overall effects of the grants given to specific centres are considered in the later section on finance but generally the grants given by OSTI were for two or three years while the centres established more recently have obtained grants for longer durations: the Marine Pollution Information Centre and the National Sports Documentation Centre have both received grants for seven years and there is little indication that these centres can exist without these funds.

This raises the questions as to whether OSTI support was too short-lived or whether centres can become completely self-supporting and these are the aspects considered in the

later section.

Subject Coverage

All of the centres cover multidisciplinary areas and as eight of the centres were established within OSTI's framework of national information requirements it is not surprising that there is little subject overlap. Some overlap has developed with the establishment of the other four centres: the Biodeterioration Information Centre, the Waste Management Information Service and the Marine Pollution Information Centre all have related services, connected with waste management and pollution, and if other types of information service are added, such as Pollution Abstracts or INSTAB (Information Service on Toxicology and Biodegradability) then there is a considerable group of services in this area. It suggests that some form of co-operative service might be worthwhile or at least regular liaison to monitor each others services and activities.

Aims and Objectives

Finally, the aims and objectives of SICs at their inception might provide some indication of the intended roles of individual SICs and allow for some comparison between their present activities and their initial objectives.

SICs supported by OSTI had a general remit based on

OSTI's concept of SICs but the aims and objectives laid down by specific centres were often framed in a general way and offered little indication of the development of the range of services envisaged by OSTI. All the centres aims were couched in the following way: to set up an experimental comprehensive information service for workers in an interdisciplinary subject in this country and abroad. Initially, only one SIC, the Biomedical Information Service, emphasized the need for the evaluation of information (Barkla 1969) and although the implication was that SICs would contribute to the development of particular subjects only two centres emphasized the importance of an SIC to directly influence the growth of a subject through its own work and not simply through the secondary information service: Eggins (1969) mentions the importance of the catalytic effect of the BIC's research and information work on subject development and Hoeck (1972) states that the activities of Rock Mechanics Information Service should directly contribute to "the development of the science of Rock Mechanics".

All SICs saw their functions as providing a "current awareness" service along with an enquiry and advisory service while the possibility of review compilation was not mentioned at these early stages.

Another major aim of the early SICs was to experiment with, and evaluate, information retrieval techniques and the work carried out usually concerned indexing techniques and methods and the suitability of external computer based systems for input. Further details of this work are given

in the later section on 'Evaluation' (Section 9.4.5).

Generally, the stated aims and objectives of SICs established since OSTI support have followed the earlier pattern with two exceptions:-

- (a) Two SICs have concentrated their services on the U.K. The National Documentation Centre for Sport and Physical Recreation and the Marine Pollution Information Centre. The reasons for this stated restriction is that similar centres exist overseas although, in practice, both the above SICs have accepted overseas users.

- (b) The above two SICs have also stated that they are purely sources of documented information and do not claim to offer personal advice or consultancy services.

Figure 44

Major organisational and service features of U.K. Specialised Information Centres

Subject of Centre	*Activity carried out by centre						
	Organisation and Services						
	Evaluation studies done	*	*	*	*	*	*
	Computer facilities		*		*		
	Enquiry Numbers	100	40	'few'	100	120	0
	Subscriber Numbers	950	160	2500	?	700	180
	Contract Research	*	*			*	
	Document Collection	*	*	*	*	*	*
	Manual Package		*				
	Computer Package				*		
	Research Register		*			*	
	Data Compilation				*		
	Scientific Journal	*					
	Critical Reviews					*	
	Enquiry Service	*	*	*	*	*	
	Photocopies/loans	*	*	*		*	*
	Bibliographies	*	*	*		*	
	S.D.I.						
	Current Awareness Bulletin	*	*	*	*	*	*
	Personnel Numbers	19	6	8	13	8	2
	How financed	USER CHARGES	USER CHARGES	USER CHARGES	USER CHARGES +GRANT	USER CHARGES	USER CHARGES
	Date established	1965	1965	1966	1965	1968	1966
		Biodeterioration	Biomedical Engineering	Biomedical	Crystallography	Ergonomics	High Temperature Processes

Apart from the B.I.C., only the Crystallographic Data Centre has working scientists directly involved in the day-to-day running of its operations and elsewhere a compromise situation has generally been adopted whereby SICs are located in scientific departments and staffed by subject specialists: subject specialists, here, refers to anyone possessing a degree in a relevant subject but not an active scientist or technologist in the subject. In this latter situation the centre should benefit particularly if departmental members are in some way involved in the activities of a centre and this is certainly true of the Ergonomics Information Analysis Centre and the Waste Management Information Centre. For instance, the latter centre is part of the Environmental Safety Group at Harwell and so scientific staff within this group are involved occasionally in answering questions and in keywording and abstracting.

With other centres, however, this compromise situation has not always produced the same level of activity as described above. In one or two instances, for example, a centre's establishment and initial growth depended on the enthusiasm of one or two people and as these people have moved on the initial impetus has also gone: this might be true of the Information Centre on High Temperature Processes and the Rock Mechanics Information Service where, initially, senior staff were involved in their development but where since the day-to-day running of the centres have been passed to other people.

Elsewhere, the location of a centre within a scientific

group has not always been enough to develop that centre extensively. There is the obvious problem that a centre is only one priority to be considered in the activities of scientists who are not directly employed by that centre. There is also the additional problem that if scientists are not employed full time by a centre they cannot adequately keep up with all the developments in the subject of that centre particularly when the subject is a new area of study. This problem can be alleviated, to some extent, if the unit in which the SLC is located is also concentrating its activities on this new subject area but in many instances an SIC is situated in a department which has much more general and varied interests. For instance, the Biomedical Information Service, the Information Centre on High Temperature Processes and the Particle Science Information Service were located in departments of physiology, fuel and combustion and chemical engineering respectively. Interestingly, the Biomedical Information Service has also recently become part of the University library service at Sheffield and has moved from the Physiology department.

Some definitions of SLCs stress the need for 'subject specialists' to operate the centres, although they do not state whether these specialists are working scientists or not. (Passman 1970, AGARD 1970). Other definitions do emphasize the need for 'working scientists' (Martyn 1970^a, Weisman 1972, Harvey 1976) but the practicalities of the situation in the U.K. show that most SLCs are not employing working scientists.

One argument against the use of practising scientists is that once they become involved in information collecting and disseminating activities on a regular basis they can no longer devote sufficient time to laboratory work and thus, by definition, become non-practising scientists but the experiences of the BIC and the Crystallographic Data Centre do not support this view. Indeed, the development of a major aspect of SIC work, that is, a contract research service, requires the participation of working scientists so it is a pity that they have not been more involved in SIC activities.

Two centres, the National Sports Documentation Centre and the Marine Pollution Information Centre have both been established within the library services of their host organisations although both employ subject specialists. The National Sports Documentation Centre also employs professionally qualified librarians and is one of six centres to have trained librarians or information scientists on their personnel. Where trained information specialists are employed they usually also possess a scientific qualification and in no instance does the number of librarians exceed the number of subject specialists employed. The involvement of information specialists in SICs should also be another important consideration since trained information workers can offer expertise in collecting, indexing, cataloguing, retrieval and publication methods as well as providing a link with the information community in general.

However, six centres do not employ any trained information workers although they all liaise, in some form or

another, with the libraries in their host institutions. The extent of this liaison ranges from having a librarian on the advisory committee of the Centre, utilising, on a part-time basis, the staff of the library, using the document collection of the library, to existing within the library service. Close co-operation with a library service can be particularly useful as resources can be shared and in the event of an SIC. closure the collection can be integrated into the library's collection.

Regarding the number of personnel in each centre, it is evident from Figure 44 , that the BIC. is exceptional in having eighteen members as only the Crystallographic Data Centre approaches this figure with thirteen members. Both these centres employ working scientists and carry out contract research and related activities so the personnel numbers include information specialists, working scientists, technicians, clerical assistants and students. Both these centres are located at universities and, given their resources, they are able to carry out the additional function of training research students in their respective subject areas: at the BIC., during the study period, there were seven such students and two research fellows involved essentially in research work plus four other working scientists carrying out information, research and teaching functions. These three activities encompassing information provision, research work, and teaching are rare amongst U.K. SICs and it is interesting to note that the BIC. personnel numbers have virtually doubled since 1969 and that this increase has been largely due to the development of a contract research service.

and the involvement with student training.

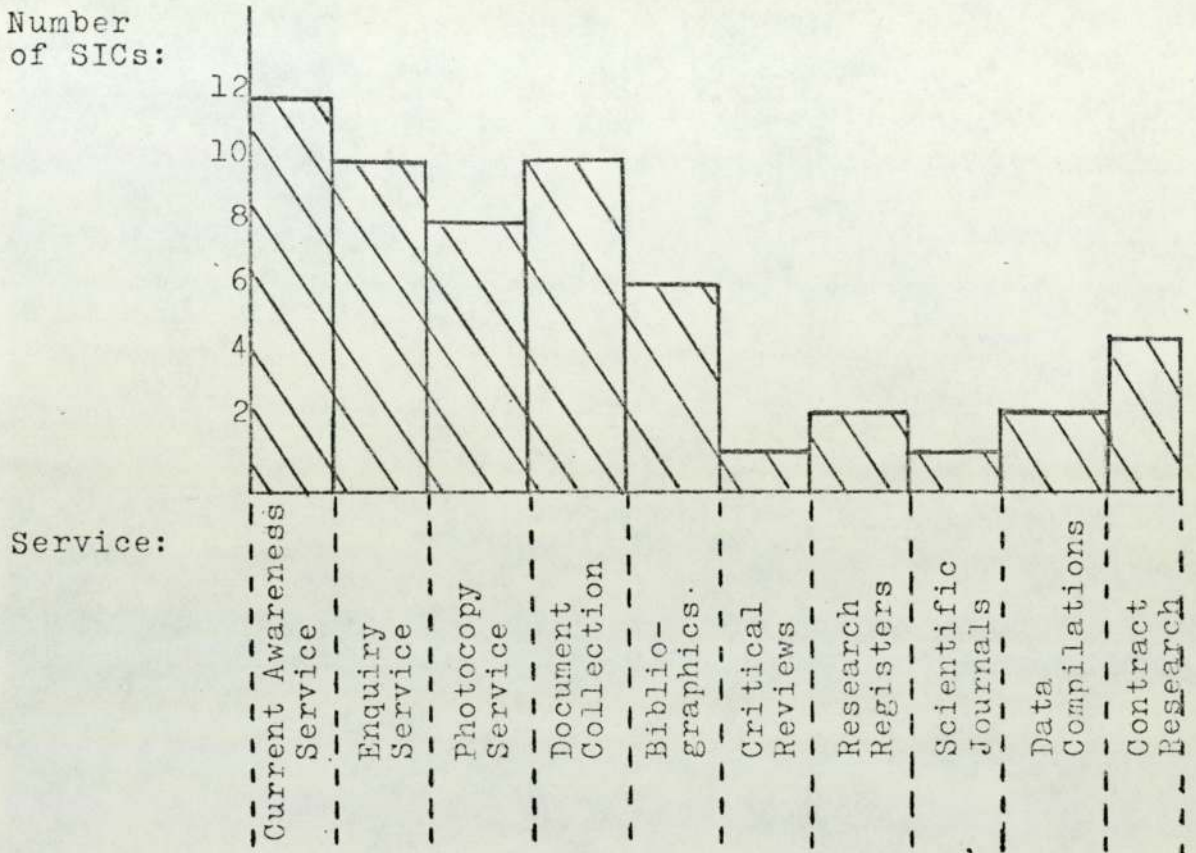
The only other centre originally supported by OSTI to increase its staff numbers is the Biomedical Information Service which has more than doubled its staff from three and a half persons in 1969 to eight in 1976: this increase, however, is not due to any research activity but to an increase in the documentation services provided by the Biomedical Information Service so the staff increases have all consisted of extra clerical support.

Actual personnel numbers among the twelve centres vary from two to eighteen although half of the centres have numbers ranging from two to five and ten of the centres have personnel figures less than double figures. The fact that centres can be run by only two people is evidence that specialist information services can be operated with minimal resources although it also implies that there will be little flexibility in service operations.

9.4.2 Services

Some of the aspects already considered will obviously affect the level and type of services offered. Staff numbers, the nature of the subject covered, the nature of the user's, the finance and the operators conception of an SIC's market are all controlling factors relating to the services offered. The diagram below sets out the range of services presently offered by SICs and their frequencies:-

Major Services of U.K. SICs



The range of services above is representative of the spectrum of services that might be offered by an ideal SIC. In reality, however, none of the U.K. SICs provide all these services and the average is approximately four of the above items.

Current Awareness Bulletin

The only widespread service is some form of current awareness bulletin and although the content, nature regularity and format of the service might vary the philosophy behind its existence remains the same: it is regular tangible evidence of an SIC's activities; it provides the majority

of users with what they need - references to recent work; it can be produced relatively easily; and is a regular source of income.

The current awareness service is generally the first service developed in an SLC, so it is not surprising that all centres, at varying stages of development provide this service.

Photocopy Service

Beyond this basic service but still at the elementary level of information provision, however, the incidence of similar services is reduced. Four centres, for instance, do not provide photocopies of references in their current awareness bulletins although two of these centres actually maintain a document collection: the absence of photocopying services is a pity since the usefulness of a current awareness service often depends not only on its coverage but on the ability of users to easily obtain cited documents.

Enquiry Service

Two centres - the Mass Spectrometry Data Centre and the Information Centre on High Temperature Processes - do not offer enquiry services although in both instances this service was originally offered but discontinued due to lack of demand. Brain, Livesey and Williams (1973) state that the enquiry service at the Information Centre on High Temperature Processes was discontinued because it proved

to be 'uneconomic'. The study of the BLC, however, has shown that an enquiry service can be viable if it is flexible enough to deal with a variety of problems and if it is linked to a contract research service. The problem with the now defunct enquiry services of the two above centres and those presently operated by the majority of other centres is that they were, or are, purely document based and all enquiries are answered by a literature search. The fact, therefore, that there may be little use made of an enquiry service may simply reflect that there is little demand for that particular form of service not that there is little demand for an enquiry service. The evidence provided by the study of the BLC shows that various enquirers need different types of answers and, although this may not be true in all subject areas, it is unfortunate that more centres have not experimented with a more flexible approach to their enquiry service.

Document Collection

Most of the centres maintain a document collection although two centres do not. Both these centres maintain computer files of their citations but the absence of actual documents will obviously reduce the potential for any effective analysis and evaluation of documents, reduce the possibilities of developing a reviewing function and cut down on the more obvious services such as photocopying and document facilities for browsing which a centre may offer. With the above centres some of these limitations can be overcome as the libraries of the host institutions contain some of the

relevant documents and some of the documents included in their services will be fairly generally available from other sources.

Other Services

When other services, particularly associated with SICs are considered it becomes obvious that SIC activity is still at a relatively modest level in the U.K:-

Research Registers - only one centre, the Ergonomics Information Analysis Centre, has produced a research register for its users. The usefulness of such a register depends on its up-to-dateness so ideally any list of research interests should be regularly updated. Unfortunately, the above register was an isolated publication and is already out of date. Other centres, including the RLC, have attempted to maintain internal research registers, for use in enquiry answering, but again, the effort involved in updating has reduced the currency of most of these registers.

Critical Reviews - The major aim of OSTI policy for centres to produce critical reviews has also not been realised. Only one centre - The Ergonomics Information Analysis Centres - offers review compilation as a service although it only produces reviews in response to individual demands. During 1975 these 'individual demands' were nil so no reviews were produced.

Scientific Journal - In the absence of a regular review service review articles can be contained in a scientific journal as occasionally happens in International Bio-deterioration Bulletin, the primary journal produced by the BIC. The production of a primary journal is another way of involving the SIC. in its scientific community but unfortunately the BIC. remains unique in this respect.

Contract Research/Consulting Facilities - Four SICs offer advisory and research services although as most of the SICs are not staffed by working scientists the centres essentially 'pass on' the contract to experts within the institution where the SIC. is housed. The exception to this rule is the BIC. which can use its own resources to deal with contract work.

Conferences/Seminars - Another possible development would be for SICs to evolve into centres of information exchange in their subjects perhaps by organising conferences and seminars. At present, no centre carries out these functions although the BIC. plays some part in organising Bio-deterioration Society activities through its working scientists.

Finally, there are other services produced by some SICs which warrant a mention:-

Firstly, two SICs offer a translation service - the Rock Mechanics Information Service and the National Documentation Centre for Sport, Physical Education and Recreation.

Secondly, the two data centres offer, on a regular basis, for sale computer packages containing all their holdings. With the Mass Spectrometry Data Centre this package is available to any interested organisations but the computer file of the Crystallographic Data Centre is mailed to ten regional affiliated centres throughout the world. The latter instance represents a viable attempt to develop a network of international SICs in a particular subject area. In this context, two SICs are also co-operating with larger data bases and are sending references to these bases regularly for inclusion: the Marine Pollution Information Centre provides abstracts for the FAO/IOC sponsored abstract journal 'Aquatic Sciences and Fisheries Abstracts' and the Ergonomics Information Analysis Centre sends references to Industrial Ergonomics Abstracts and Applied Ergonomics.

Finally, a unique service which regularly keeps users informed of developments and invites their comments is produced by the Biomedical Engineering Information Service: this is a regular newsletter entitled Project Fair which is mailed to all service subscribers.

9.4.3 Users

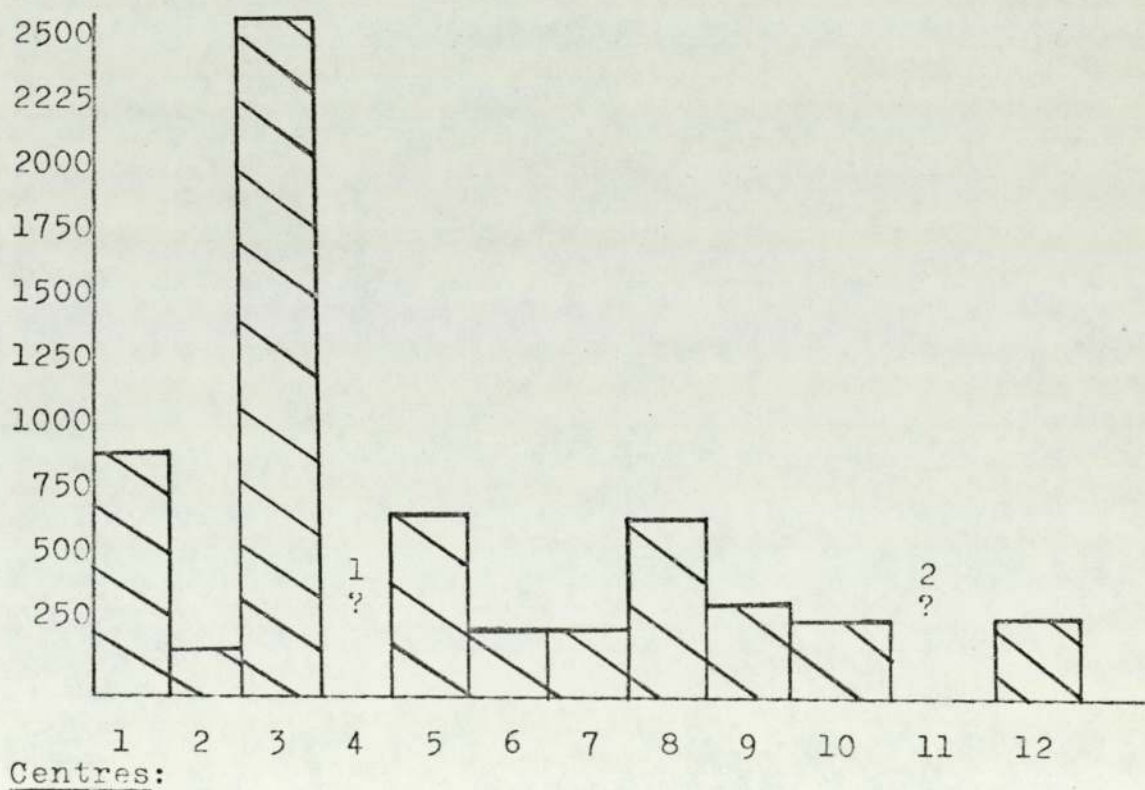
The BIC has reached an international market, particularly with its journals and has large user groups in the industrial and academic sectors. It has also developed notable links with the practitioners in its field, particularly through its enquiry service.

How far these general use patterns are typical of U.K. SICs is considered by referring to the two services offered by most centres - the Current Awareness bulletin and the Enquiry Service.

Current Awareness Bulletin

If subscriber numbers for the twelve centres are plotted on a histogram the following distribution results:-

(a) Subscriber Nos of UK SICs (1976)



(b)	Centres with 100 - 500 subs.	=	6
	500 - 1000	=	3
	over 1000	=	1

- ?1 Journals sent to national centres in 12 countries but exact subscribers unknown.
- ?2 Journals published by Pergamon Press - no subscriber figures available.

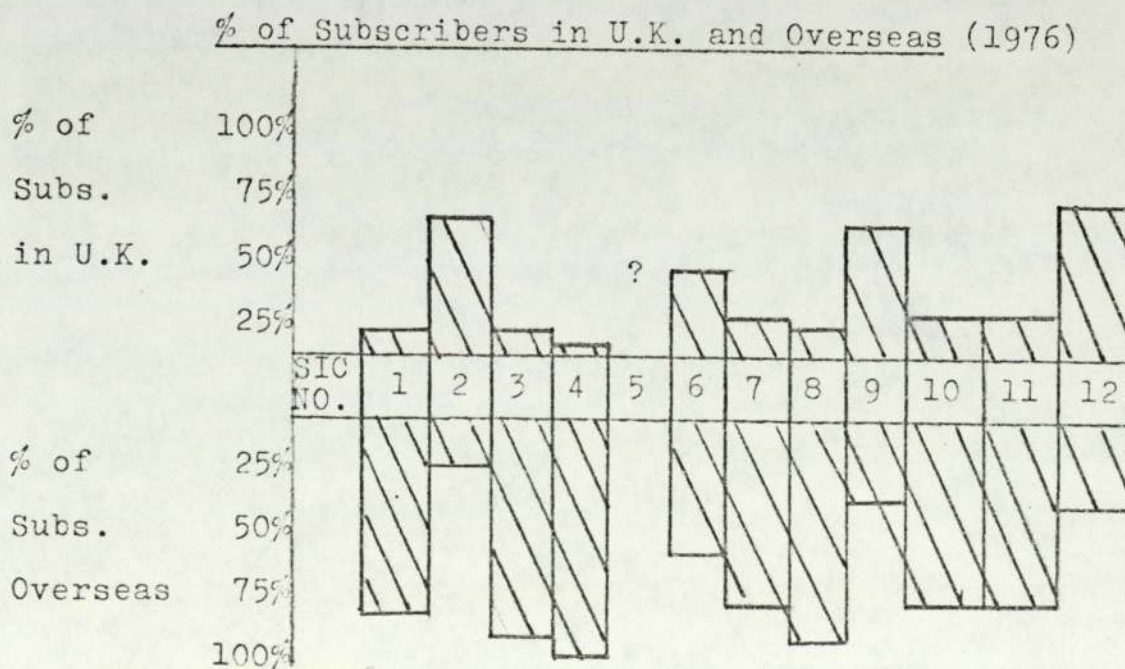
Although the range of subscriber numbers runs from 160 to 900 it is apparent that the majority of centres have subscriber figures between 150 and 400 with no centre having over a 1000 regular subscribers: although the Biomedical Information Service has over 2000 subscribers these are total subscribers to a variety of alerting services and only 350 of this 2000 subscribe to the major current awareness bulletin.

The implications from the above figures are that a U.K. SIC has an upper limit of 1000 subscribers but is more likely to reach a market of 400-500 subscribers. There are, however, variables which will effect the size of the user group:-

Firstly, it is obvious that if an SIC can diversity and extend its services then it should increase its subscribers: the development of a new current awareness journal at the BIC generated another 200 users while the creation of a variety of alerting services at the Biomedical Information Centre has pushed total subscribers up to over 2000. For a number of centres, however, the relatively small amount of staff and other resources may be a significant obstacle preventing further expansion and diversification.

Secondly, the development of a range of services for a variety of user types such as researchers, educationalists and technologists and the appropriate advertising of these services should increase user numbers. Unfortunately, only the B.L.C., the Waste Management Bureau and the Mass Spectrometry Data Centre suggest that they are used by a variety of user types while the remaining centres are patronised by university and other research workers.

Thirdly, the ability of an S.I.C. to attract overseas users should increase user numbers and is often considered imperative for S.I.C. survival (Harvey 1976, UNISIST 1975). In this context all U.K. centres have attracted overseas users and the majority of centres (eight) have more overseas users than in the U.K.. Full details are shown below where the relative percentages of U.K. subscribers and overseas subscribers are given for each centre:-



5?. Ergonomics Information Analysis Centre - Subs. figures not available from publisher.

Seven SICs have 75% or more of their subscribers overseas and another centre has 66% of its users overseas. Three centres have more U.K. subscribers than overseas but these centres also have overseas subscribers comprising 20%, 35% and 30% of their users respectively.

Finally, since the SICs were established at different times, do subscriber numbers simply reflect their varying stages of growth and could it be argued, particularly with SICs established around 1970, that their markets are still developing and capable of expansion?

The experiences of those SICs established in 1965/66 suggest that the great majority of subscribers will be obtained in the first four or five years of an SIC's operations and if this pattern is repeated in those SICs established later it suggests that none of the present subscriber figures are likely to alter significantly and that a core of regular subscribers has already been obtained.

The table below shows how, in absolute terms, subscriber numbers for the SICs established in 1965/66 have varied very little since 1969:-

<u>SIC</u>	<u>Subs Nos in 1969*</u>	<u>Subs Nos in 1976</u>	<u>Direction and % Change</u>
Biodeterioration	900	950	+ 3.3%
Biomedical	180	160	-11.0%
Biomedical Eng.	300	340	+13.3%
High Temp Processes	160	180	+11.0%
Mass Spectrometry	700	600	-14.0%

*figures taken from Robertson and Reynolds (1969)

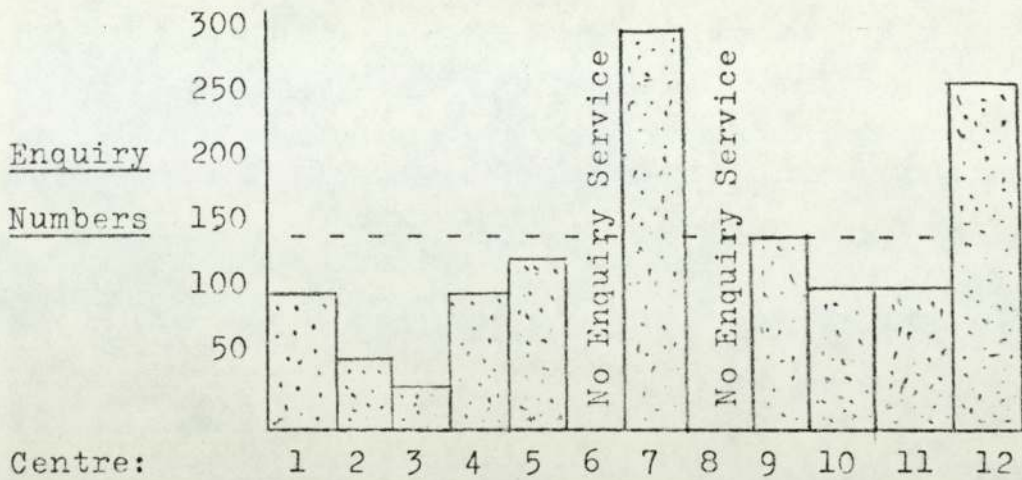
The B.I.C., for instance, despite the creation of a new journal has only increased subscriptions by fifty while the Biomedical Engineering Service, with the largest percentage increase has only obtained another forty subscribers in the last five years. There have even been negative percentage changes with the Mass Spectrometry Data Centre losing 100 subscribers.

The reasons for the small changes in user numbers may stem from changes in the growth of a subject, changes in the policy and services of a centre or changes in the general economic climate but given the experiences of the OSTI supported SICs the assumption can be relatively confidently made that subscriber numbers of U.K. SICs are unlikely to alter greatly in the years to come. Although this means that SICs are unlikely to expand greatly in the future it may also mean that most SICs have been successful in obtaining a core of regular users relatively quickly and thus should safeguard their operations for some time to come.

Enquiry Service

The general view amongst SIC operators is that the enquiry service is a supporting service to the current awareness bulletin but not a major service in its own right. This view is particularly evident in two centres when only subscribers to the current awareness bulletin are eligible to use the enquiry service.

Annual enquiry figures for the twelve SICs are given below:-

Annual Enquiry Numbers (1976) of U.K. SICs

Annual enquiry figures vary from zero, in two instances where the service has been abandoned, to 298 but over half of the SICs have enquiry numbers less than 150. Generally, SICs established last have the largest enquiry numbers while those SICs created in the mid-sixties have all experienced a levelling off of enquiries after increases in the early years of their development. A pattern which is likely since new information services in developing subject areas are likely to receive more enquiries at the initial stages of their development than later when other services of an SIC will have developed and become widely known. The more efficient user handling of an SICs bibliographic journals, as time goes on, may also reduce enquiry numbers.

However, the levelling off of enquiries may be accompanied by an increase in the technical expertise of the enquiry: this is certainly true of enquiries obtained at the BIC which, in its early years, were of a general nature

but which have become increasingly more technical and detailed.

The major limitation of virtually all the services is that they are purely document based. Users tend to be largely researchers and, in this way, use of the enquiry service mirrors the use of a centre's current awareness bulletin. In other words, with most SICs the same people use both the current awareness bulletin and the enquiry service and, as a result, the value of the enquiry service to attract new users is diminished. The BIC. does not follow this general pattern since its enquiry service is neither purely document based nor are its users confined to 'so-called' scientists and researchers (Allen 1966) in universities and research institutions: they also include 'technologists' involved in day-to-day problems of biodeterioration.

9.4.4 Finance

This section does not provide any detailed analysis of the finances of individual SICs but simply makes some general comments on the economics of SICs. SICs are operating in developing subject areas where markets are ill-defined so an SIC's finances may be far from stable and although many of the financial problems experienced by SICs are also experienced by other information services these problems may be more acute in SICs.

SICs generally need grant aid to be established in

the first place and to provide the 'shelter' in which services can be developed. The problem is how long should the grant last and can SICs become self-supporting anyway? OSTI support in the sixties was generally for three years but a number of people have suggested that this was not enough to allow the optimum development of the SICs services (B.I.C. 1968, Martyn 1970^a, Harvey 1976). A number of SICs obtained supplementary grants while others were forced to carry out cutbacks in staff and resources at a time when their services were only just beginning to develop. The provision of specialist information is a costly business and it appears that if an SIC is required to produce the whole range of services associated with an SIC then it must be grant-aided or, at least, obtain significant subsidies from its host institution.

Some U.K. SICs have remained grant-aided since their inception and others have recently accepted grants from publishing firms which have obtained control of a SIC's publications in return - the Rock Mechanics Information Service, the Particle Science Information Service and the Ergonomics Information Analysis Centre are examples of the latter. The problem with the grants given is that they are too small to allow the SIC to develop a wide range of services and may even restrict the development of an SIC by maintaining its services at a low level: the grants are usually enough to maintain one or two staff members, produce a bulletin and offer an enquiry and photocopying service and without extra staff or resources the SIC cannot experiment with other services. As new service areas are not being investigated, new

demand is also not being generated and the SIC operators are unable to argue for additional funds.

Where SICs receive no direct grant aid they usually depend on their host institutions to support or absorb some, or all, of their running and production costs. The BIC, for instance, receives financial support from the University of Aston notably for the provision and maintenance of the building which the BIC occupies and the payment of two staff salaries. Every other U.K. SIC also obtains economic benefits from its location in a larger institution either through the provision and maintenance of a building, the payment of staff salaries, the payment of postal or telecommunication charges or the subsidised use of the institutions library, computer or printing facilities. The general conclusion, therefore, is that complete self-sufficiency for any SIC, and certainly those existing at present, is practically impossible and all need to operate, for practical financial reasons, within a larger, more stable institution.

The co-existence of grant aided SICs and SICs moving towards some level of self-support represents, in miniature, the economic problems of information provision generally since this dual situation confuses the user's perception of the economic price of a service and may cause him to underestimate a service's economic cost. For SICs this is particularly unfortunate since it may force them to offer their services at below their actual cost or it may deter potential users if prices appear too high.

Figure 45 shows the prices of the two major services offered by U.K. SICs in 1976. Although detailed running costs of most SICs were not available a number of centres suggested that the user costs did not reflect the true costs of production (SICs marked with an asterisk obtain some grant aid and are able to subsidise charges).

Prices of the current awareness bulletin vary from £6 to approximately £60 (£135) but half of the SICs have prices between £10 and £20. These prices show the relatively low user costs of SICs when compared with other scientific information services: Chemical Abstracts costs £1000 a year but more appropriate comparisons include the major specialist services used by the BIC. For instance, Rapra Abstracts at £60 per annum, Microbiological Abstracts at £120 per annum, BFMIRA Abstracts at £50 per annum and Textile Abstracts at £45 per annum* all cost considerably more than the great majority of U.K. SIC services.

Enquiry charges appear to be laid down in an arbitrary way and there is no real consensus on the best way of charging for an SICs services: four SICs have a combined subscription price, five SICs have separate charges for the current awareness bulletin and the enquiry service and one SIC offers free enquiries to everyone.

* figures taken from British Scientific Documentation Services 1974. By 1977 Chemical Abstracts cost £2,950.

Figure 45

(* Grant aided, in part or in full)

Service Charges to Users of U.K. Centres (1976)

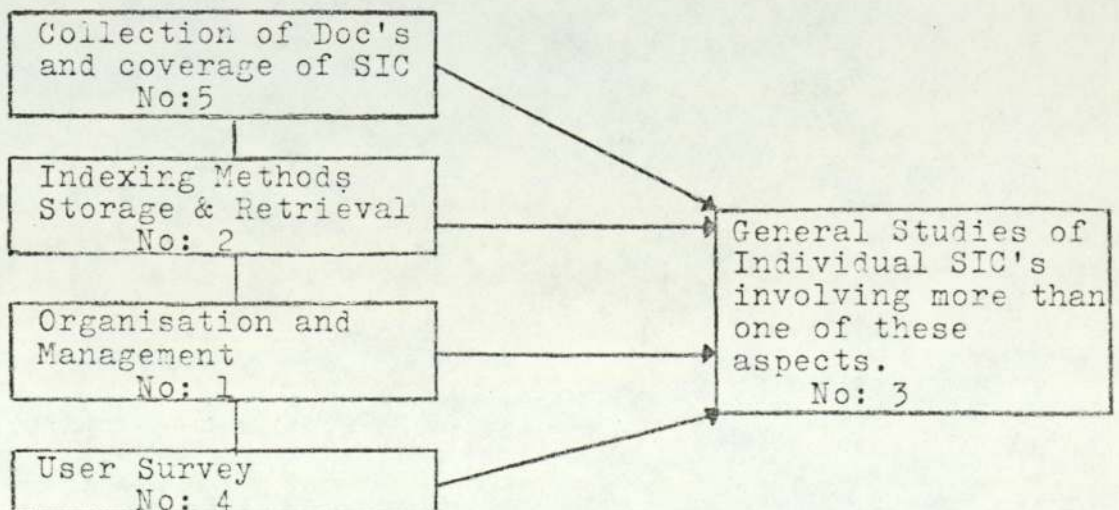
<u>Centre</u>	<u>Service Charges</u>	
	<u>Current Awareness Bulletin(pa)</u>	<u>Enquiry Service</u>
1. Biodeterioration Information Centre	£10	£8 (for 2 hours search)
2. Biomedical Eng. Information Centre	£10	Free to subscribers
3. Biomedical Information Centre	£16	Free to subscribers
*4. Crystallographic Data Centre	£15	£10 (minimum charge)
5. Ergonomics Infor. Analysis Centre	£23	Free to subscribers
6. Information Centre on High Temp Procs.	£10	-
*7. Marine Pollution Information Centre	£15	Free
*8. Mass Spectrometry Data Centre	£45	-
*9. National Sports Documentation Centre	£6 50p	Nominal Charge (Varies between enquiries)
*10 Particle Science Infor. Service	£21	£3 (for one hr)
*11 Rock Mechanics Infor. Service	£135	£3 - £9
*12 Waste Management Information	£30	Free to subscribers

9.4.5 Evaluation

For specialist services operating in ill-defined markets the need for regular evaluation would seem to be imperative but the major problem is lack of time and resources since all effort needs to be directed towards the production of services. Nevertheless, those SICs initially supported by OSTI were established as experimental information services and some evaluation of their activities has been carried out. Furthermore, only two SICs established since OSTI support have not undertaken some form of evaluation although regular evaluation has been largely impractical.

In this section, details of the studies carried out are given by reference to individual SICs and the diagram below presents an overview of the type of studies done. Essentially, only those studies which have been published are included although a number of SICs have carried out small-scale internal studies.

Subject of Studies carried out in individual SICs



In view of the problems of the financing of SICs it is unfortunate that there is a lack of any studies which attempt to examine the costs and benefits of SICs and compare the financing of a range of SICs.

There are also few published reports of studies into the indexing methods or the organisation of SICs but with OSTI supported centres ongoing studies of this kind were being carried out but they were never published.

A brief description is given below of the studies undertaken of individual SICs.

1. Biodeterioration Information Centre

Detailed references have already been made throughout this thesis to the studies undertaken at the BIC and it is sufficient to note, at this stage, that the programme of studies undertaken at the BIC represents the most consistent attempt to achieve regular evaluation:-

1968 - a study of the organisation of the BIC.

(University of Aston 1968)

1969 - an evaluation of the Co-operating Specialists scheme (Willsher and Eggins 1970)

1970

-73 - a study of External Computer Services and their usefulness as input to the BIC.

(Martyn 1974)

1973

-76 - A study of the Use Patterns of the BIC.

2. Biomedical Engineering Information Centre

Most of the published work in indexing and retrieval methods relating to U.K. SICs has originated from this centre. A major aim of the centre was to explore the possibilities of members of a learned society helping in the indexing of relevant documents: a sample of scientists chose relevant documents and then used their own words to describe the topic of the paper (Pickford 1967, 1968), and these words were then used to develop an unstructured retrieval language (Pickford 1971) which now forms the basis of the service IRBEL, a retrospective search system available on subscription (Horsnell and Pickford 1967). IRBEL is described as an 'on desk' library for every subscriber and is a manual system consisting of a reference booklet, produced three or four times a year, and a subject index on punched feature cards (Pickford 1969). By using these cards relevant references are found and each subsequent issue of the package updates the subject index.

In 1973 a small localised user survey of scientists within the host institution was carried out and the results are reported in the Fair Newsletter (Thomas 1974).

3. Biomedical Information Service

A general survey of the service was carried out from 1969 to 1972 and incorporated the following aspects:-

- (a) A user survey - users were asked to indicate

those aspects of the service they had found most useful in practice

and

- (b) an examination of computer based services to assess their potential as reference sources.

The results of (a) suggested that there was a greater demand for current awareness services than for retrieval systems and the results of (b) suggested that computer services were not satisfactory partly because relevant references were absent from the data bases. (Barkla 1973).

The results of the study produced some action since from 1971 to 1973 a variety of current awareness services were established to supplement the monthly abstracts journal. There are three additional series covering specialised topics and, interestingly, two of these series are produced by repackaging manually relevant sections of Index Medicus, the hard copy equivalent of the computerised service, Medlars.

4. Crystallographic Data Centre

The major work of the Centre has involved experiments to develop an effective computer storage and retrieval system for Crystallographic data and to develop co-operative computerised activities with associated centres in other countries (Kennard, Watson, Allen, Motherwell, Town and Rodgers 1975). Robson (1976) has also recently completed a general review of the data compilation activities being undertaken in the U.K. and this includes a consideration of the

effectiveness of the Crystallographic Data Centre.

5. Ergonomics Information Analysis Centre

A study was carried out in 1971 by a student team from the Applied Psychology Department at the University of Aston (University of Aston 1971). The study analysed the objectives of the centre, its operational activities and use of each of the centres services. The general conclusions were that additional subject specialist staff were needed. Some re-appraisal of the Centre's potential clientele was needed particularly in relation to the largely untapped industrial market and the consultancy activity should be expanded. Unfortunately, the user samples and response rates were small (an average 10% response) and the organisation of the centre has undergone considerable change since the study so it is difficult to see how it relates to the centre's present activities.

6. Information Centre on High Temperature Processes

Present low staff numbers are likely to preclude any extensive evaluation exercises in the future but near the end of the period of the OSTI grant a user survey was carried out to discover how many people would continue to use the bulletin in view of the intention to charge for the bulletin for the first time, and to gain some estimate of the financial return which could be expected with a subscription of £5 per annum (McLintock 1968). The response rate was 50% and about half of these (approx. 70) suggested

that they would continue their subscription. At the time of the study the bulletin was only circulated in the U.K. but it was intended to distribute it worldwide when charging was introduced: the study gave a circulation estimate of 375 copies, interestingly more than double the present subscriber figure of 180 and the 1969 figure of 160 when charges were first introduced (Robertson and Reynolds 1969).

General details of the subscriber composition and an analysis of the coverage of the centre are given in an article in Astib Proceedings (Brain, Livesey and Williams 1973).

7. Marine Pollution Information Centre

Low staff numbers have again made extensive evaluation impracticable and the only exercise undertaken so far has been an internal study of the coverage of the marine pollution literature by the computer service, Pollution Abstracts (Moulder 1976).

8. Mass Spectrometry Data Centre

This is another centre which has concentrated a considerable amount of its research effort on evaluating the usefulness of using external computer based search services for selection of relevant references. Studies have considered Human versus machine selection for current awareness purposes, profile construction and computer retrieval procedures (Jager, Maxwell and Ridley 1968, Searle 1970)

The general conclusions have been that the use of computers allows a large increase in the size of the data base which can be searched, that the number of items found by computers alone is small when compared with manual scanning of journals and, given the time limitations relating to manual scanning by staff, economic use should be made of all relevant computer systems.

In 1974 an M.Phil thesis was also produced reporting on a study of the current awareness bulletin produced by the centre (Searle 1974). The study examined the coverage and currency of the bulletin and also involved a user and potential user survey. The user study was based in the U.K. and had an 80% response rate and the general conclusions were that the bulletin was used as a supplementary source of information, was used only by researchers and not by those involved in routine applications who had no need for the service and the general areas of common dissent concerned its print quality and the time lag before the inclusion of a reference.

9. National Sports Documentation Centre

Some basic figures analysing the literature coverage of the current awareness bulletins and the use made of the service have been obtained internally. (Bell 1973).

10. Particle Science Information Service

No work has been done on the service's activities but

a related study was carried out at Loughborough University (Linn 1975). The aim of the study was to test the feasibility of compiling a data base for particle science from subsets of available magnetic tape information services and to overcome difficulties arising from the lack of standardisation and co-ordination amongst these services. The study was a preliminary investigation which provided guarded support for the use of computerised secondary services as the only way to cover "cross-cutting interdisciplinary topics".

11. Rock Mechanics Information Service

Limited staff resources have again reduced the possibilities for any present information studies but a major study of the communication activities and the information needs of earth science engineers and the role of the Rock Mechanics Information Service was carried out between 1970 and 1973 (Gralewska, Vickery and Roscoe 1975). The main conclusion of the study stressed the need for an earth science engineering information centre which would incorporate rock mechanics, geotechnology and all the other related subjects which were being considered as 'separate specialisms'.

12. Waste Management Information Centre

No studies have been undertaken.

9.5 A Note on U.S.A. SICs

Sics have developed to the greatest extent, both in terms of numbers and services, in the U.S.A. and this note attempts to outline the major characteristics of U.S.A. centres and to suggest any lessons that might be learned from the American experience. SICs have been in existence in the U.S.A. since 1940 (Simpson 1962), there are now approximately 200 in the U.S.A. and the general assumption is that they are 'bigger and better' than their U.K. equivalents. A small sample of thirty five U.S.A. centres was chosen randomly from the U.S. Directory of Information Services and Centers 1975 and information obtained on their organisation and services.

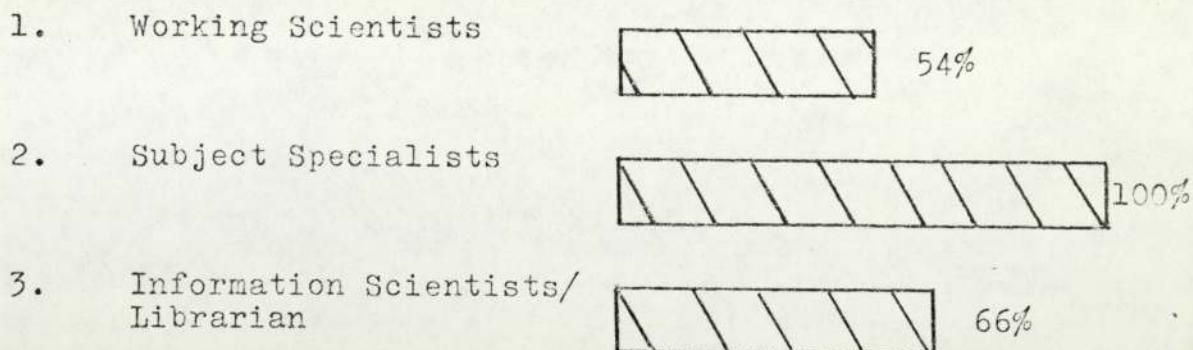
The major difference between the situations in the U.K. and the U.S.A. is that in the U.S.A. funding of SICs is largely the responsibility of the central government and the development of SICs is largely geared to national information requirements: a number of centres have been established to support the defence and space programmes of the U.S.A. The centres are generally established close to their user group, often they are 'Mission orientated' in the sense that they are established to support a particular project, and 'mission orientated' SICs do not always offer their services extensively and seldom have users outside the U.S.A.

All the SICs in the sample were federally supported and the involvement of certain SICs in particular projects

is reflected in the sample: four of the thirty five S.I.C.s selected had been closed down since their inclusion in the directory. This represents a mortality rate of approximately 14% and the closure of S.I.C.s in the U.S.A. is not unusual: the Prevention of Deterioration Centre, a predecessor to the B.I.C., was also closed in 1963 at the end of its final grant period. Closure of S.I.C.s is an accepted part of the overall development of S.I.C.s in the U.S.A. and the centre's collections are often integrated into larger library systems.

The other major differences between U.S.A. centres and those in the U.K. are that U.S.A. S.I.C.s have, generally, more staff, more U.S.A. S.I.C.s employ working scientists and U.S.A. centres offer a wider variety of services.

Of the thirty five U.S.A. S.I.C.s examined four had closed and the remaining thirty one had staff numbers varying from three to one hundred and fifty. Although this represents a wide variation in staff numbers, twenty one of the S.I.C.s had staff numbers in double figures and twelve of the S.I.C.s had over twenty members of staff. Staff complements are therefore much higher in the U.S.A. as is the percentage of working scientists involved in U.S.A. S.I.C.s. Eighteen of the thirty one S.I.C.s employed working scientists, all centres employed subject specialists and twenty two had information scientists or librarians on their staff:-

% of U.S.A. SICs with:-

and

U.K. Fig: 1. 15% 2. 100% 3. 50%

The services offered by U.S.A. SICs are also more extensive than those in the U.K. with particular importance attached to the provision of reviews and SDI services; in addition to the regular services such as current awareness bulletins and enquiry services:-

Twenty one of the U.S.A. SICs carry out some form of reviewing function and Twelve of the U.S.A. SICs provide an SDI service.

9.6 Conclusions

The general conclusion must be that the development of SICs in the U.K. has been relatively modest, particularly in relation to the OSTI definition of the sixties and more recent statements by Gray and Perry (1975) and UNISIST (1975).

Although SICs have certain common characteristics, such as their interdisciplinary nature and their economic environments, there are also wide variations between SICs in their organisation and services offered: the hypothesis that the BIC is representative, in its organisation and activities, of other U.K. centres is not supported by the facts collected. Rather, the BIC finds itself amongst the most active of SICs offering a range of services which is only matched by a few other centres, notably the Biomedical Engineering Information Centre and the Ergonomics Information Analysis Centre. The involvement of working scientists, its triple functions of information, research and education, the development of laboratory services and a close liaison with the scientific community are all factors which separate the BIC from most other U.K. SICs.

Unfortunately, a number of U.K. SICs examined are essentially only document based services which rarely employ working scientists and which do not offer services, such as contract research facilities and reviews, which are associated with SICs. As most SICs were established within scientific research departments it is particularly disappointing

that more SICs have not utilised the close supply of scientists and technologists.

A number of reasons for the modest development of SICs can be suggested:-

Firstly, a particular subject area may not require the provision of a whole range of services but may be satisfied with just a current awareness bulletin and a supporting photocopy service: an SICs lack of certain services will reflect the lack of demand for these services. The problem is that needs are not always expressed so that an SIC may feel that it is responding to its user group but may be offering a less than optimal service as it ignores unexpressed needs.

Secondly, SICs of differing ages are likely to show different levels of development although most U.K. SICs have been in existence for at least five years: in this time a significant service level should have been created.

Thirdly, there is the fundamental argument that SICs will never be developed fully unless they are supported regularly by outside funds and, preferably, geared to the national information requirements of the country.

Perhaps however, the development of SICs is influenced most by the factors which affect the day-to-day running of individual SICs. If so, then this modest development has been the result of a series of variables such

as the length and timing of grants, the departure of individuals who have acted as the 'driving forces' behind certain centres, the management decisions of the host institutions and the initial conceptions by operators of an SICs role - initial views on how a service should develop often remain the basis on which decisions are made despite the fact that circumstances change.

Whatever the reasons for the relatively low level of SIC activity in this country, and even the BIC does not offer a review service or carry out certain evaluative functions associated with SICs, there is still a need to encourage SIC activity, or, at least, to discover whether future developments relating to SICs would be desirable. Therefore, the following suggestions are proposed:-

1. SICs should become part of a co-ordinated national information programme. The involvement of the U.K. in the EEC may also require SICs to become part of a European information programme eventually.
2. In the absence of any national information programme the British Library should, at least, undertake to review its policy on SICs and present this review to the information community.
3. The possibility of establishing a group of SIC operators should be considered. In this

way, experiences and views could be exchanged and, particularly, the less developed or newer SICs could benefit from the experiences of the other SICs.

4. Some thought should be given to developing reviewing services, perhaps on an experimental basis, in SICs and finally,
5. Although mention is often made of the economic problems of SICs little practical work has been carried out to investigate the cost effectiveness of SICs. This may also be a useful area for investigation.

Chapter 10Conclusion

- 10.1 Introduction
- 10.2 The Study of Biodeterioration Internationally and Research Output.
- 10.3 The Establishment and Development of the B.I.C.
- 10.4 Use Patterns of the B.I.C.'s Information Services
- 10.5 Future Service Developments and the Potential for Future Growth
- 10.6 The Development of S.I.C.'s in the U.K.
- 10.7 Conclusion

10.1. INTRODUCTION

The establishment of the B.I.C. at a university and its staffing by practising subject specialists provided a good opportunity for the centre to carry out the type of functions associated with S.I.C.'s. These functions include not only the provision of bibliographical services but also the development of contract research facilities and the creation of review services. The B.I.C. has also developed into a primary contributor to the subject, biodeterioration, through its staff's research work and the publication of original work. The educational role of the B.I.C. within the university is also emphasised as the centre has developed into a training centre for young scientists and students.

When the survey reported here was carried out the B.I.C. had been operating for ten years and a range of services was available although little attempt had been made to investigate use patterns.

This survey not only considered the use patterns of the B.I.C.'s journals, enquiry service, photocopying service, and contract research service, but also examined the wider context in which the B.I.C. and its users were operating: including an examination of the study of biodeterioration, the potential use of the B.I.C. and the relationship of the B.I.C. to other S.I.C.'s. B.I.C. records and files were examined, postal questionnaires were sent to samples of users and non-users, interviews were carried out with a sample of subscribers and B.I.C. use was monitored over a period of time. High response rates were obtained from all the questionnaires with the exception of those sent to non-subscribing enquirers which produced only a 33% response so

little significance could be attached to these replies.

The methodology was used to test a number of linked general hypotheses which formed the basis of the research works and the results are considered below:--

10.2. THE STUDY OF BIODETERIORATION INTERNATIONALLY
AND RESEARCH OUTPUT

First, the study examined the subject and scientific community that the P.I.C. aimed to serve in order to examine the hypothesis that the study of biodeterioration was concentrated in a few geographical areas. The distribution of the study of biodeterioration is important not only because it can offer a guide to the likely distribution of B.I.C. users but also because it may indicate whether the study of biodeterioration problems is concentrated in the western industrialised countries, as with most other subjects.

An investigation of the reference input to Biodeterioration Research Titles (E.R.T.) in 1975 showed a definite concentration of reference producing countries: fifty-eight countries and twelve international organisations supplied references and the top three countries produced half of the reference total. Over 75% of the references came from the top ten countries but the countries presented included western industrialised countries such as the U.S.A., U.K., and West Germany, other industrialised countries such as Japan and Australia and developing countries such as India and Israel. Biodeterioration research, therefore, is not concentrated in the west and this observation is emphasised by a consideration of total references in 1975: the developing countries produced more references than Western Europe, excluding the U.K.

Another point is that reference producing authors were concentrated in those institutions concerned solely with research rather than in the higher education sector or industrial firms.

However, exclusivity in the biodeterioration research community is markedly emphasised by a study of certain other means of communication and contact in the subject: 39% of all papers included in the International Biodeterioration Bulletin have come from the U.K. for instance, and over 25% of the contributed papers have come from only seven authors. The Biodeterioration Society in 1975 had 241 members located in twenty eight countries but over 88% of total membership came from Europe and North America. Active member participation is also concentrated in the U.K. which is the only country where regular meetings are held.

10.3. THE ESTABLISHMENT AND DEVELOPMENT OF THE E.I.C.

The establishment of the E.I.C. in the U.K. has also emphasised this concentration of activity in the subject in the West and relates to the second hypothesis which stated that the E.I.C. had benefited from strong links with the bio-deterioration community. The study of the development of the E.I.C. from 1965 to 1975 supports this hypothesis. The initiative of an O.E.C.D. group of experts led to the creation of the E.I.C. and a biodeterioration information network out of which grew the co-operating specialists scheme at the E.I.C. In this scheme biodeterioration workers throughout the world sent in references to the E.I.C. and, as the E.I.C. was headed by a practising microbiologist, contacts for the scheme could be established relatively easily. The scheme was abandoned in 1969 due to the problems of administering it but the influence of the scientific community on the E.I.C. activities is still evident: E.I.C. staff are research workers in biodeterioration and through them the E.I.C. is involved with the scientific community; the Consultative Council of the E.I.C. includes scientists and researchers in biodeterioration; the Editorial Boards of B.R.T. and I.B.B. are made up of subject specialists; the I.B.R.G. secretariat is based at the E.I.C; and I.B.B. is dependent on the scientific community for its input. Therefore, the scientific community has been, and still is, particularly involved in the development of the E.I.C. although it has inevitably been the scientific community located around the E.I.C. which has had the greatest influence. How such areas as the developing countries can influence the E.I.C. more strongly is considered later when the possibility of establishing regional information centres is noted.

The university and the information community have also been important in the B.I.C.'s development. The university has provided readily available expertise and low cost accommodation and overheads while the influence of the information community is reflected particularly in the grant provided by O.S.T.I. for the B.I.C. in 1965 for three years.

The financial interest of O.S.T.I. in the B.I.C. is now being justified as the B.I.C. continues to develop while the B.I.C. has repaid the university by contributing extensively to the university's work: mainly through the training of research students but also through the publicising of the university's activities to a wider audience.

The O.S.T.I. grant period represented the first period of B.I.C. development and was followed by two other definable time periods and in each period certain characteristics of B.I.C. growth can be identified: the period from 1965 to 1968 was a period of experimentation to assess the potential of a biodeterioration information service and to experiment with information retrieval techniques, organisation methods, and service output; the second period from 1968 to 1971 began when an extension to the original grant was obtained: this suggests that a period of three years financial support may not be enough to allow a specialised centre to develop adequately. This period was a time of consolidation with few new developments and a gradual move towards the stabilisation of B.I.C. use, to more efficient organisation and production methods and to a rational charging policy. The major characteristic of the third period from 1971 has been the development of a wide range of services, in particular the contract research service, the creation of a realistic charging policy and the levelling off of user numbers.

The development of laboratory based services, in particular, is reflected in the present staff composition of B.I.C. which is largely made up of practising subject specialists.

By 1975 user numbers had stabilised and an examination of B.I.C. records showed the following general use patterns: world wide circulation of the two major journals with 701 subscribers in forty eight countries although 48% of subscribers were located in the U.K. and the U.S.A.; subscribers came from a wide variety of institutions with universities and colleges, research institutions and industrial firms predominant - 27.3% of subscribers came from universities and colleges, 23.2% from research institutions and 21.9% from industrial firms and over 90% of industrial firm subscribers were located in the U.K. and the U.S.A.; the enquiry and photocopying services were patronised largely by U.K. users; and new services increased the market base for the B.I.C. - a new journal Waste Materials Biodegradation Research Titles created 200 new subscriptions and the developing contract research service provided income from practical work obtained from U.K. organisations.

10.4. USE PATTERNS OF THE B.I.C.'S INFORMATION SERVICE

Given this apparent user distribution, the third general hypothesis stated that the use patterns of the information services varied in different geographical areas and the user survey examined this hypothesis. The general conclusion must be that the hypothesis is an oversimplification for although use patterns do vary there are often a number of factors which influence these variations. Only with the enquiry service and contract research services are there obvious variations in use patterns which can be related to geographical area since both services are largely patronised by U.K. users and, in particular, industrial users in the U.K.

The specific results of the survey of P.R.T., I.B.B., the enquiry service and the photocopying service and the contract research service are detailed below:-

BIODETERIORATION RESEARCH TITLES (B.R.T.)

B.R.T., the regular bibliographic journal of the B.I.C. is really the 'bread and butter' service of the centre: it provides a regular source of income and a regular indication of the B.I.C.'s activities.

75% 75% of the survey sample scanned B.R.T. when it arrived: 48% scanned the whole document, and 27% scanned certain sections. Sections containing references on timber preservation and timber deterioration were the individual sections scanned most often, reflecting the fact that references on timber cover a relatively high proportion of the total references contained in B.R.T. and the fact that a relatively high percentage of the respondents were from wood preservation firms or were working in the field of wood preservation.

However, 24.5% of the sample stated that they never scanned B.R.T. for current awareness purposes. This represents a significantly high minority of respondents and it is particularly interesting to note that 66% of this minority is made up of librarians. More importantly, the great majority of these librarians were unable to offer any indications on the use of B.R.T. except to note that it was usually placed on the library shelves. Assuming that the sample is representative and remembering that 41% of total B.I.C. subscribers are librarians this suggests that in a significant minority of instances, there will be little information available on the use patterns of the journal and possibly even underutilisation of the journal by its potential clientele. The problems of identifying the ultimate user of an information service or even of knowing whether users exist are reflected in the above point. When the journal is scanned for current awareness purposes the survey statistics show that relatively few references cited are actually followed up. 65% of respondents followed up less than five references per issue out of approximately 450 and generally only one or two references from each issue were followed up. Given that B.R.T. is not a selective service aimed at individual users then this low number of references followed up is probably acceptable, particularly as most respondents stated that they were satisfied with this figure. Unfortunately, within the limits of the survey, it was impossible to examine the usefulness of individual references in solving particular problems or in adding to a subscriber's subject knowledge.

The general arrangement and content of the biblio-

graphic entry in B.R.T. was also acceptable to the majority of respondents. When asked particularly if they were willing to pay more for entries with abstracts 67.5% replied that they were satisfied with the present annotated title entry. Similarly, the absence of a detailed index is not a major limitation to the effective use of B.R.T.: 68% of respondents were unwilling to pay more for indexes provided that the cross referencing system used in the journal was comprehensive and consistent.

The absence of indexes might be a hindrance to the retrospective use of B.R.T. although 38.5% of respondents stated that they had used B.R.T. at some time for retrospective searching or knew of other colleagues who had used it. In this context, it appears that people often turn initially to a general discipline based service, such as Biological Abstracts or Microbiology Abstracts for retrospective searching purposes particularly as many of these services have larger files than the newer specialist services and, incidentally, comprehensive indexes. Only when these services fail to produce any answers are the smaller specialised services used. A point, however, is that many of the discipline based services ignore certain document types, such as trade literature, which the B.I.C. covers.

The survey also showed that the user numbers of B.R.T. cannot be measured by a simple examination of the subscriber numbers as 78% of respondents stated that they were not the only users. On average, 3 people see each issue and statistical analysis suggests that actual readership figures are likely to be between 1200 and 2000 rather than the recorded circulation figure of 584.

Finally, many respondents stated that B.R.T. was particularly useful for its coverage of material not included in other services and this reflects the usefulness of an S.I.C.: the provider of information not easily available elsewhere.

INTERNATIONAL BIODETERIORATION BULLETIN (I.B.B.)

The production of a primary journal such as I.B.B. is also consistent with the aims of an S.I.C. although there are problems relating to the relatively high production costs and the relatively low readership of individual articles.

The survey showed that users of I.B.B., like users of most other primary journals, read only a small amount of the articles presented to them: over 70% of respondents read less than 20% of the articles presented to them in 1975 and, on average, 21% read each article. Users in the interview sample were asked to list the exact articles that they had read from I.B.B. in 1975 and the results showed that 90% of the articles were read by 30% or less of the sample. Figures for individual articles varied from a low of 3.6% for one article to the highest readership figure of 36% for another article.

This pattern of readership is typical of primary journals and various methods have been suggested to overcome the deficiencies associated with primary publishing: methods such as the creation of synopsis journals, the division of journals into smaller sections, and the combining of journals in similar subject area. However, from an economic viewpoint, it is unlikely that any of these methods could be applied to I.B.B.

As with B.R.T., 22.2% of the sample never scanned I.B.B.

at all and this percentage was made up largely of librarians. Again, the journal was placed in the library and no indication of its use was available. However, I.B.B. was seen by more than one person in 78% of the instances and actual circulation figures varied from a low of zero in the U.K. to a figure of nineteen for one organisation in the U.S.A. Statistical analysis suggests that actual circulation figures will be at least 2.4 times as great as the recorded circulation figure of 604 and may be as high as 6.4×604 .

ENQUIRY AND PHOTOCOPYING SERVICES

Since 1971 enquiries have stabilised just below the 100 mark per annum and the detailed survey of enquiries received between 1972 and 1975 showed that the majority have come from the U.K.: in 1972 and 1973, 80% originated in the U.K. and in 1974 and 1975 the figure was 75%. A definite geographical bias exists therefore in the enquiry service and the low number of overseas enquiries suggests that many enquiries are being dealt with in individual countries.

The high percentage of U.K. enquiries has also influenced the type of organisation submitting enquiries and, in this context, the highest percentage of enquiries has come from industry. In 1972 and 1973, 46% of enquiries came from this sector and 37% came from industry in 1974 and 1975.

Another feature of the service was that there was a roughly 50 - 50 split between subscriber and non-subscriber enquiries and this suggests that the service can act as a useful advertising agent and image maker for the B.I.C. The service is often the first point of contact for new users and, therefore, has the potential to attract new users to the other services of the B.I.C., such as the journals or the

contract research service. In this context, the second largest group of enquirers have required information to solve a specific practical problem and most of these enquirers have been non-subscribers. This suggests that the enquiry service can play an important part in directing people to the laboratory services of the B.I.C. and also shows the importance of subject specialists to the B.I.C.'s activities.

Another interesting finding showed that a large number of non-subscriber enquiries were referred to the B.I.C. by working scientists and this emphasises the importance of the scientific community to the B.I.C.'s activities. Even enquirers not directly involved in biodeterioration research work and hence, the scientific community have reached the B.I.C. through working scientists, and another group of enquirers discovered the B.I.C. through the publishing and general information exchange activities of scientists at the B.I.C.

The study also indicated that the presence of subject specialists at the B.I.C. and, to some extent, the nature of enquiries received, have apparently reduced the dependence on the B.I.C.'s document collection in answering enquiries. The telephone, for instance, was a major tool in answering enquiries, particularly those urgent enquiries requiring quick answers. The general answering procedure was also quite quick, with half of the enquiries being answered within a week and 20% of enquiries receiving an answer on the same day that they submitted their enquiry.

The small amount of literature searches carried out to answer enquiries reduced the income available from the service and the absence, until early 1975, of a consistent charging policy, particularly for non-subscriber enquiries, also con-

tributed to the problem: generally, no charges were made for enquiries that did not involve a literature search although, in many instances, enquirers requiring a search were never charged. Even with a rigid charging policy, the present level of user activity is unlikely to increase significantly the income of the service but, again, the broader influence of the enquiry service must be emphasised: its importance lies not in its own direct income producing capabilities but in its ability to link a user with other B.I.C. services.

There is also the photocopying service and its use, as might be expected, was linked particularly with the current awareness services. The major conclusion must be that very few subscribers use the B.I.C. as a regular source of hard copy, particularly as services such as the British Library Lending Division can satisfy most requirements. There was a small core of regular users, all from the U.K., but generally it appears that subscribers use the service occasionally to obtain references that are difficult to obtain elsewhere.

CONTRACT RESEARCH SERVICE

Mention should also be made of the Contract Research Service for although the service was not examined in detail in this study, it is evident that it is becoming increasingly important as a B.I.C. activity and that it can provide income to subsidise the B.I.C.'s other information activities: in 1974 and 1975 nine research contracts were undertaken at the B.I.C. and these produced over £22,000 in income. A significant point is that five of the nine users had previously used the B.I.C.'s enquiry service thus reflecting the importance of the service as an introduction to the other B.I.C. activities.

THE RELATIONSHIPS BETWEEN B.I.C. SERVICES AND ACTIVITIES

The previous sections have summarised the specific results of the user survey of particular B.I.C. services but the survey also identified a number of general points about the B.I.C. which are worth mentioning.

First, there is general satisfaction with the range of services offered although a number of suggestions for future developments were expressed and some of those are considered in the next section.

Secondly, there is the major point that all the B.I.C.'s information services are inter-related and any consideration of the usefulness of the services must allow for this inter-relationship. The linkage between one service and another has already been shown to exist with reference to the enquiry service, which has channelled users to the contract research service and the journals but all the services are linked: the journals serve as a regular reminder of B.I.C. activity and can draw users to the enquiry and contract research services; I.B.B. brings in authors and contributors who may be unaware of the B.I.C.'s activities; in solving practical problems the contract research service and enquiry service may attract more regular users to the other services; and finally, the document collection acts as the central resource for all these services.

In this context, the studies of the various components of the B.I.C. information service have suggested that the journals, particularly I.B.B. and the enquiry service have little direct income generating potential and that they are largely subsidised by the contract research service. However, the previous sections have shown that a consideration of only the income - expenditure aspects of each service will

underestimate the contribution that individual services are making to overall B.I.C. activity.

The third general point relates to the above question of costs of individual services for although it is evident that certain services are subsidising others and that this is acceptable, given service inter-relationships it is still necessary to review the expenditure on individual services as frequently as possible and to minimise expenditure increases. This is particularly true of a service such as I.B.B. which has suffered in recent years from an escalation in paper and printing costs. In recent years, steps have been taken to reduce unnecessary expenditure in the production of services but the rationalisation of the charging policies of the B.I.C. has taken a little longer to achieve.

Throughout the development of the B.I.C. there has been little attempt to implement rigorous charging policies and this can be attributed to two or three points: first, the B.I.C. is part of a publicly supported institution which has an obligation to provide information to as wide a range of people as is possible; secondly, the need to create stable markets for the products of a specialised service may mitigate against the development of rigorous charging policies, particularly in the formative years of service development; and thirdly, it is difficult to charge for something that many of the staff of the B.I.C. would do anyway, even if the B.I.C. did not exist, that is, provide information to their colleagues working in biodeterioration.

However, since 1975, the rationalisation of the B.I.C.'s charging policies has become almost complete with journal prices reflecting higher production costs and enquiry service

charges being introduced for both subscribers and non-subscribers. Certain problems still remain in one or two areas: despite the introduction of charges for all enquiries, for instance, only 14% of enquirers were actually charged during 1975; and there are still groups of subscribers, such as Biodeterioration Society members and Sustaining Associates who are receiving the journals at very low prices and the discriminating charging policies adopted by the B.I.C. need to be examined again.

The results of the use patterns study also suggested that the document collection was underutilised. For instance, most subscribers obtain hard copies of documents from elsewhere and only 33.5% of enquiries were answered directly by providing references or documents. The lack of detailed indexes to the collection also seems to have reduced its effectiveness. Given that a significant amount of resources are devoted to maintaining a comprehensive collection and that space limitations are a particular problem at the B.I.C. it may be desirable to relax the comprehensive approach of the collection and restrict the number of documents obtained to those that are not easily available elsewhere. The only problems with the above approach are that the document collection is also used to support teaching and research activities in Aston University and that a comprehensive collection may be an attraction for workers in the biodeterioration field. However, there are a number of university and college libraries in the area, as well as other libraries, and this suggests that the B.I.C. could at least stop obtaining copies of articles from those journals that are easily accessible elsewhere.

10.5. FUTURE SERVICE DEVELOPMENTS AND THE POTENTIAL FOR FURTHER GROWTH IN USER NUMBERS AND USE PATTERNS

The results of the user survey brought out some suggestions for future service developments and, coupled with the results of the study of certain potential user groups, they offer some evidence to support the hypothesis that the B.I.C. has reached its optimum level of users. More specifically, it appears that if the B.I.C. maintains its present service level its use will not increase by any significant amount although there is always the possibility that new services, and thus new markets, will be developed in the future.

The study of specific potential user groups surveyed three groups containing individuals and organisations which were possible regular subscribers to the B.I.C.: authors who had papers cited in B.R.T., Biodeterioration Society members and non-subscribing technical enquirers. The general conclusion was that although all these groups had some interest in bio-deterioration, this interest was usually secondary to their main interest or field of work and this reason, coupled with the cost of the services, was the major obstacle preventing a regular subscription. A number of respondents stated that it was enough to know of the existence of the B.I.C., for future reference, and this suggests that the B.I.C. must be flexible enough to deal with occasional users and to benefit from them. Easily accessible enquiry and contract research services are good ways of attracting these occasional users.

However, a comparison of the geographical distribution of research output in 1975 and the distribution of subscribers did suggest that there was room for further subscriber-growth in the developing countries. In India,

particularly, sixty nine institutions were identified in 1975 alone, as reference producing institutions but subscriber numbers are only twenty five.

The developing countries may require a different service from that presently operated before they utilise the B.I.C. to any extent and this leads on to the feasibility of establishing smaller information centres in areas such as the developing countries to serve local needs. The idea of an international group of information centres on biodeterioration was mooted when the B.I.C. was established in 1965 and

Gray and Perry (1975) have envisaged international networks of information centres developing to serve a specialised subject. Biodeterioration would appear to be an ideal subject for experiments in network development as biodeterioration is an international problem, and is particularly evident in developing countries, and because of the links with the scientific community that the B.I.C. has established which could be used to obtain the cooperation of individual scientists in any international scheme. At the very least, the B.I.C. should concentrate its attention on the developing countries, either through publicity campaigns or individual contacts, in an attempt to increase subscriber numbers and users in these areas.

New markets can also be opened up by developing new services and the surveys of B.I.C. users and potential users offer three or four suggestions for future service developments:-

1. REVIEWS: Review articles are occasionally printed in I.B.B. but the B.I.C. has no regular review service. The production of critical reviews has always been associated with S.I.C.'s and a recent report by Woodward (1975) suggested

again that experiments in regular review compilation should be carried out in S.I.C.'s. A number of B.I.C. users also expressed a desire for reviews on certain topics and the availability of research staff and students at the B.I.C. would suggest that such a service could be operated. For instance, every research project at the B.I.C. could produce a review as a by-product of the research work and based on the references collected for the work. Alternatively, the links with the scientific community could again be utilised to commission subject specialists to write reviews.

2. OTHER PUBLICATIONS: As Waste Materials Biodegradation Research Titles has shown, new users can be obtained by the introduction of a new current awareness journal or some other publication covering a related field. One possibility would be to develop a journal aimed at the practitioner in industry which would balance the research bias of B.R.T. and I.B.B. This journal might contain practical information on preservative and remedial treatments, details of contacts to help with biodeterioration problems, news items and letters from its users.

3. WORKSHOPS/SEMINARS: the practitioner in industry, with little expertise in biodeterioration problems, could also be served by workshops and seminars on particular materials or aimed at specific industries. These workshops could again utilise the practical expertise developed at the B.I.C., they would add a further dimension to the range of services offered, and could be used to publicise the enquiry and contract research services.

10.6. THE GENERAL DEVELOPMENT OF S.I.C.'S IN THE U.K.

The user survey provided information on the use patterns of the B.I.C. and offered some suggestions for future developments, but the results of the survey may also be applicable to other S.I.C.'s in the U.K. Therefore, the final hypothesis stated that the organisation, services and use patterns of the B.I.C. were typical of other U.K. S.I.C.'s and twelve S.I.C.'s were examined to test this hypothesis.

The clear conclusion is that the B.I.C. is not typical of other U.K. S.I.C.'s and that its range of services and users is much more widespread than most other centres. The typical functions of information provision, research and education carried out by the B.I.C. are not apparent in most other S.I.C.'s and most centres are a long way off carrying out the kind of functions associated with S.I.C.'s and envisaged by O.S.T.I. in 1965. The development of S.I.C.'s in the U.K. has been relatively modest with many S.I.C.'s content to run only document based services and with only two centres employing practising subject specialists. User numbers are generally less than the B.I.C., there is little evidence of use by the industrial sector, and laboratory services and research training activities are virtually non-existent.

Given that there is a need for S.I.C.'s in the information community, there is also a need to encourage S.I.C. activity and this could be done in a number of ways: by including S.I.C.'s in a co-ordinated national information programme; by the British Library undertaking to review its policy on S.I.C.'s and presenting this review to the information community; and by the establishment of a group of S.I.C. operators

to discuss common problems. Mention is often made of the economic problems of S.I.C.'s yet there has been little attempt to investigate their cost effectiveness and this is a specific area where future work would be useful.

On a specific level, as the B.I.C. is one of only two centres employing working scientists and the only centre with its own laboratory facilities it would appear that it is one of only two centres in the U.K. that could develop the full range of services associated with S.I.C.'s and which many North American S.I.C.'s already offer. The modest development of U.K. S.I.C. activity again emphasises the need for the B.I.C. to move continually towards the full range of services envisaged by O.S.T.I. in 1965 and to utilise, to the fullest extent, the subject specialists on its staff.

10.7. CONCLUSION

To summarise, therefore, the user survey will, it is hoped, have produced some practical results which will improve the B.I.C.'s service provision. It has also enabled the user's viewpoint to be put and thus balance previous evaluation at the B.I.C. which concentrated on the input to and the retrieval methods of the B.I.C.

Generally, it has shown that users are satisfied with the services provided although the B.I.C. is still some way off providing the full range of services that distinguish S.I.C.'s from other information services.

Two general points emerge: the B.I.C. needs to be continually aware of the range of markets available for its services and to be ready to introduce new services, or modify existing ones, where appropriate; and a regular evaluation of the B.I.C.'s activities and services and their use is important - already investigations are taking place into the feasibility of computerising the B.I.C.'s documented collection and services (Allsopp 1976) and hopefully, at some stage, the effects on the user will be considered.

Appendix 3

Method of estimating population mean from sample mean.

(used to estimate circulation figures for journals -Sections 5.3 and 6.3. ,and articles read. Section 6.3)

1. Calculation of sample mean.
2. Transfer of data into logarithms.
3. Calculation of standard deviation.

$$\text{Formula: } \sigma = i \sqrt{\frac{\sum fx^2}{N}}$$

where

i =size of class interval

f =frequency in each class interval

x =deviation from the mean in terms of class intervals

N =total frequency

4. Calculation of the standard error of the mean.

$$\text{Formula: } \sigma M = \frac{\sigma}{N}$$

where

σ =standard deviation

N =total frequency

5. Sample mean $\pm 1.96 M$ gives an estimate of the population mean with a 95% probability.
6. Transformation of results back to original form.

Ref: An introduction to statistics for the Social Sciences, 3rd edition. Connolly, T.G. and Sluckin, W. 1971.

Appendix 2

Method of calculating correlation coefficient between research institutions and subscriber institutions (Chapter 8, Section 8. 3)

X	Y	x	y	x ²	y ²	xy
187	179	+99.5	+99.2	9900.25	9840.64	9870.4
106	148	+18.5	+68.2	342.25	4651.24	1261.7
51	31	-36.5	-48.8	1332.25	2381.44	1781.2
28	34	-59.5	-45.8	3540.25	2097.64	2725.1
124	72	+36.5	-7.8	1332.25	60.84	-284.7
29	15	-58.5	-64.8	3422.25	4199.04	3790.8
<u>525</u>	<u>471</u>			<u>19869.5</u>	<u>37722.72</u>	<u>19144.5</u>

X =research institutions
 Y =subscriber institutions

Formula

$$r_{xy} = \frac{\sum xy}{N \sigma x \sigma y}$$

where

- rx y -correlation between the two variables x and y.
- x -the deviation of any X value from the mean of all the X values.
- y -the deviation of any Y value from the mean of all the Y values.
- σ x -the standard deviation of the x values
- σ y -the standard deviation of the y values
- N -the total number of cases.

$$x = \frac{19869.5}{6} = 3311.58 = 57.54$$

$$y = \frac{37722.72}{6} = 6287.12 = 79.29$$

$$r_{xy} = \frac{xy}{N} \quad x \quad y = \frac{19144.5}{6} \quad \frac{57.54}{79.29} = 0.69$$

Figures exclude U.K. organisations

Appendix 1

Enquiry Card enclosed in each issue of Biodeterioration
Research Titles (B.R.T.)

BIODETERIORATION INFORMATION CENTRE QUESTION ANSWERING SERVICE
ENQUIRY CARD

QUESTION:

I require the answer to cover

(a) All relevant papers

(b) Key papers only

(c) All relevant papers published

after.....

I require the answer in the form of

(1) Lists of reference numbers (for location of full references in BRT)

(2) Copies of summaries/title pages of relevant papers

(3) Photocopies at 5p per page (if required please complete and return the declaration on the Photocopy request card below)

Name.....

Address.....

.....

Telephone No.

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