

NATIONAL
LIBRARY
OF NEW ZEALAND

Te Puna Mātauranga o Aotearoa



**NATIONAL BIBLIOGRAPHIC DATABASE
AND NATIONAL UNION CATALOGUE:
*ECONOMIC VALUATION***

Research Report
for
Electronic Services Directorate
National Library of New Zealand *Te Puna Mātauranga O Aotearoa*
by
McDermott Miller Limited

October 2002

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I PREFACE

I.I BRIEF

In May 2002 the National Library of New Zealand Te Puna Matauranga o Aotearoa commissioned McDermott Miller Limited to research and measure the national economic benefit of the National Bibliographic Database ("NBD"), the National Union Catalogue ("NUC") and their access, identification and supply functions. The National Library's commission included a brief, which defined the purpose, objectives and scope of the valuation project. In summary the intention of this report to the National Library is to estimate the:

- *National economic benefit of the NBD/NUC and its component services in its current (2002) state;*
- *Opportunity cost to the nation if the current NBD/NUC is abandoned.*

I.II REPORT OUTLINE

The **objective** of this report is to present the findings of the valuation of economic benefit in a form which assists the National Library's advocacy of ongoing government funding of the NBD/NUC and helps clarify its future strategic options.

It achieves this by:

- explaining the philosophy behind the evaluation of the NBD/NUC and methodology of the approach (section 1);
- defining the NBD/NUC alternatives which are evaluated;
- presenting the valuation of NBD/NUC user and existence benefits;
- presenting the costing of the NBD/NUC service;
- presenting total net economic value of the NBD/NUC by summarising the benefits and costs (section 5); and,
- finally, drawing conclusions about economic value based on the present use of the NBD/NUC by examining the opportunity cost both if:
 - *either* the NBD/NUC is abandoned
 - *or* it continues to have limited market penetration; and,
 - researching ways to maximise the economic benefits of the NBD/NUC to the nation.

I.III

REPORT ANNEXES

The research findings are further documented in the following Technical Annexes by McDermott Miller October 2002:

Annex I. Current And Future Usage Of NBD/NUC

Annex II. Valuation Of Benefits Of NBD/NUC

Annex III. Integrated Economic Valuation Of NBD/NUC

The Annexes present additional material on research methodology, data and assumptions, intermediate results, and final results.

There are two further technical reports on the *National Bibliographic Database and National Union Catalogue: Economic Valuation* project:

Survey of End-Users McDermott Miller August 2002. This reports the results of the CATI Questionnaire administered to end-users of bibliographic reference search systems as the first part of the survey of end-users. The survey specifications of the end-user survey are also given in that volume. The interactive stated-preference section of the survey of end users is reported in the present volume.

Survey of Reference Librarians and Cataloguers McDermott Miller August 2002 - this presents the results of the survey of reference and catalogue librarians designed and analysed by McDermott Miller and delivered by Te Puna Support for the Electronic Services Division of the National Library of New Zealand.

The valuation project also draws on two recent reports to the National Library: *National Library of New Zealand Market Research Project Phase 1: Current Knowledge and Research Gaps* (McDermott Miller June 2002).

National Library Electronic Services Costing Model, Deloitte, October 2002.

And contributes to:

National Library Electronic Services: The Case for Free Access: Report to Electronic Services Directorate National Library of New Zealand Te Puna Maturanga O Aotearoa (McDermott Miller Limited, September 2002)

I.IV

ACKNOWLEDGEMENTS

McDermott Miller gratefully acknowledges the support of the many people who assisted with the research for this project. In particular, we would like to thank the management and staff of the Electronic Services Directorate of the National Library of New Zealand. This includes guidance received from Graham Coe, Director of Electronic Services and Jenny McDonald, Manager of Te Puna Support; and, assistance with survey design and delivery by Customer Support Consultants Rachel Healy, Ruth Miller and Ann Barrie; and, Business Development Specialist Sarah Wigley.

We also acknowledge with thanks the help and support provided by public, tertiary and specialist libraries during the survey phases of the NBD/NUC valuation project.

II FINDINGS

II.I ECONOMIC VALUE OF NBD AND NUC

- Total Economic Value of the NBD/NUC as it is today is estimated to be \$160.6 million.
- The benefit-cost ratio of the NBD/NUC is 3.5 : 1. In other words, the net present value of every dollar expended in providing the NBD/NUC to end users returns a value of \$3.50 to them.
- If the NBD/NUC ceased functioning and all existing facility was lost, the national economy would lose around \$160 million.
- Significant opportunity would appear to be open to the National Library to expand the number of users given the very low penetration of the potential market for bibliographic services. For example, on the face of our analysis fewer than 20% of university students access the NBD/NUC. An increase to 25% would add around \$22 million to the Total Economic Value of the NBD/NUC.
- There also appears to be opportunity to grow value through increasing the number of searches per user, as users become familiar with the wide-ranging attributes of the NBD/NUC.
- On the other hand there is probably little immediate growth likely in mean WTP, other than for business users.
- This analysis leaves the future value of the NBD/NUC firmly in the hands of the National Library. By marketing the NBD/NUC to intermediate and end-users and increasing awareness of its utility, the National Library could add significant value to the knowledge economy"

II.II OPPORTUNITY COST OF LIMITED MARKET PENETRATION

- Total membership at New Zealand's public libraries in 2001 was 1.96 million (source LIANZA Public Library Statistics, 2001). This represents (setting aside the point that some individuals are members of more than 1 public library) around 54% of New Zealand's usually resident population of 3.6 million aged 5 and over (50% of all ages population of 3.9 million)
- There are an estimated 53-54,000 end-users of NBD/NUC; assuming all end-users are members of public libraries (although they may not normally access NBD/NUC via their public library) only around 3% of public library members are users of NBD/NUC.
- Doubling the NBD/NUC penetration of public library members and assuming that the new users make the same searches per user as the existing users, this would add around \$40 million to the Total Economic Value of the NBD/NUC. This can be regarded as the opportunity cost of use of NBD/NUC being limited to only a narrow group of users
- Although this is beyond our brief, we suggest that it is possible to realise this potential national economic value by widening access to the NBD/NUC.

1. EVALUATION METHODOLOGY

1.1 WHAT IS THE NATIONAL BIBLIOGRAPHIC DATABASE AND NATIONAL UNION CATALOGUE?

The NUC is a union catalogue of (theoretically) all holdings in NZ libraries. It is a shared resource; all subscribing libraries are expected to upload their holding data to it.

The NBD is a “superset” of the NUC. In addition to the NUC there are overseas bibliographic records (with no holdings information) sourced from Library of Congress, the British Library, and the National Library of Australia (Kinetica).

The NBD/NUC is an important resource for both librarians and library customers. To the librarian it represents as a minimum, a resource for sourcing catalogue records for new acquisitions to a library’s collection. For a library customer it is a tool for searching all the catalogues of subscribing libraries concurrently, either to find and interloan a particular item not held by their local library, or to research a reference topic of interest.

The NBD/NUC contains around 7 million bibliographic records and around 10.5 million holdings statements and it constitutes a unique information resource which:

- Builds and maintains its databases;
- Develops access tools enabling researchers’ access to the National Library’s own collections and international publishing;
- Enables access to external record sources for efficient cataloguing;
- Provides an electronic service linking document discovery by searchers to effective document supply, thereby providing a unique search and interloan service to end-users, while reducing duplication of materials in individual libraries;
- Helps manage and enlarge collections;
- Provides advice and support for New Zealand libraries and information organisations as a whole.

NBD/NUC “clients” include school, tertiary, public and specialist libraries, as well as private individuals, companies and other organisations that access through the National Library’s website.

Client libraries are both users of NBD/NUC services and suppliers through providing records of holdings within their own collections.

The records and cataloging process is depicted in **Figure 1.1** (over) and the process of searching bibliographic reports and interloaning documents via the NBD /NUC, is depicted in **Figure 1.2** (also over):

Figure 1.1: Records and Cataloguing

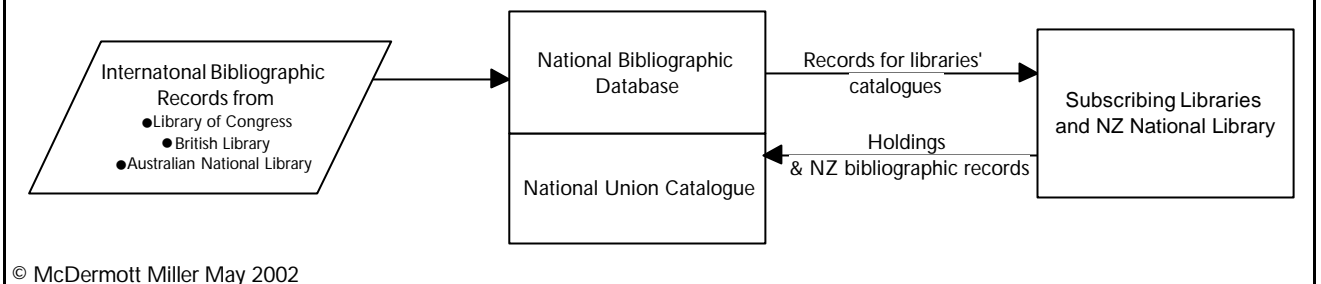
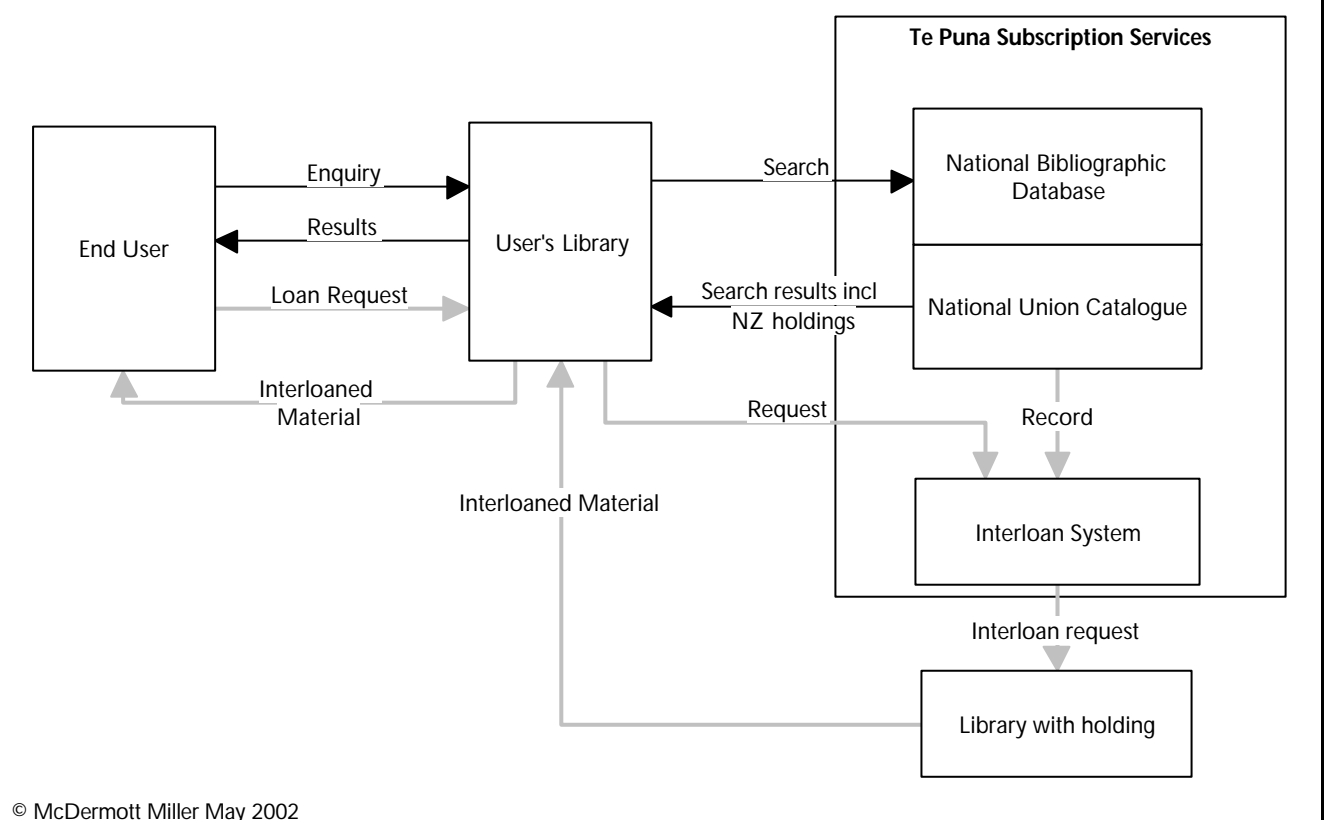


Figure 1.2: Searching & Interloaning



CURRENT THREATS

The NBD/NUC function within the National Library faces two principal threats:

- Some New Zealand libraries, while supporting the NBD/NUC concept, neglect to add original records or holdings statements, reducing the comprehensiveness of the NBD/NUC resource; and,
- Competition from other database products (such as OCLC in the United States) apparently driven by the perception of some client libraries that Te Puna subscriptions to the NBD/NUC are too costly. Withdrawal of these libraries from the NBD/NUC would threaten the future viability of the system.

1.2

NEED FOR EVALUATION OF NBD/NUC

The National Library's current strategic framework identifies two major outcomes from the Library's work. These state that through the activities of the National Library, New Zealanders will be enabled to participate and prosper in a society that is shaped by both:

- *'access to knowledge and information'; and by*
- *'a dynamic cultural heritage'.*

The first of these outcomes recognises the prevailing emphasis within current economic policies on the need to develop and support a 'knowledge economy': that is to say:

' ... an economy ... in which the generation and exploitation of knowledge play the predominant part in the creation of wealth' (United Kingdom Department of Trade and Industry, 1998).

The second outcome reflects the significance of the National Library's cultural and heritage collections to advancing the government's commitment to:

' ... nurture and sustain vibrant arts and cultural activities which all New Zealanders can enjoy and through which a strong and confident cultural identity can emerge' (Heart of the Nation, 2000: 15).

The NBD/NUC is the principal tool for providing intellectual access to these collections, as well as the accumulated information resources of New Zealand libraries and the most significant library collections in the English-speaking world and represents a vital strategic resource for achieving these outcomes.

As the management and evaluation of government policies focuses more closely on the significance of outcomes, a corresponding need arises for more systematic methods of measuring the value of those impacts on the community produced by the allocation of public resources. In common with other government agencies, the National Library now needs to be able to place both a tangible economic value and an intangible cultural value on:

- the services it provides;
- the user and client benefits it produces; and its performance relative to its statement of intent.

ADDITIONAL BENEFITS OF VALUING THE NATIONAL BIBLIOGRAPHIC DATABASE AND NATIONAL UNION CATALOGUE

The current interest internationally in 'the knowledge economy' has sparked a wide variety of research exercises designed to establish the economic value of information and library services. These have included studies at a national level (such as that recently carried out for the National Library of Australia); studies of public library systems (such as those recently undertaken in the state of Florida and the city of St Louis in the United States); and studies of specialist libraries, where the relationship between information and innovation has been a research

focus (such as recent studies of medical libraries in Pittsburgh). All of these have used variations on the evaluation models outlined in Section 1.3 and have produced benefits consistent with their brief such as:

- Valuing the contribution of libraries to economic development;
- Quantifying the return on investment from the support of libraries; and,
- Suggesting which future strategic directions are likely to produce a more effective contribution from libraries to economic development.

Beyond the specific results sought from each of these studies, however, unanticipated results have arisen that have served to reinforce the significance and status of the institutions under study. For example:

- **Libraries vs the Internet.** The rapid growth of the internet and its ready accessibility exercises a bewitching attraction over information-seekers motivated by either leisure or professional interests. Too often, however, this leads to a suspension of disbelief concerning the quality of the content on offer. Research projects to value library services have, in certain cases, led to the development of new roles for libraries (rather than being supplanted by the net). Research libraries in particular are beginning to develop standards for the evaluation of internet sources as a service to users and clients. Paradoxically, then, whereas the internet has been seen by certain commentators as a threat to the future of libraries, comparisons between the relative value of library and internet services have led to an extension of the professional role of librarians in:
 - increasing the level of instruction they may offer in evaluating internet sources; and,
 - adapting traditional collection development techniques to electronic resources.

Given that a primary outcome of the National Library involves a vision of a 'society ... shaped by a vigorous cultural heritage', measurement of these intangible values, and the value of access to these resources afforded through NBD/NUC, is an integral element within the calculation of value that has been undertaken.

We also emphasise that other cultural values, which cannot be measured through surrogate pricing techniques, also inhere in the National Library's collection. These include:

- Aesthetic value
- Spiritual value
- Social value
- Historical value
- Symbolic value
- Authenticity value

Among the benefits associated with NBD/NUC and Te Puna is that they provide a portal through which New Zealanders can achieve some understanding and

appreciation of these values as expressed through the National Library's collections.

1.3

ECONOMIC VALUATION THEORY AND TECHNIQUES

ECONOMIC IMPACT ANALYSIS

Traditional economic valuations, Economic Impact Assessment ("EIA") of monetary tradable goods and services (those that can be acquired for a payment [price] in money, such as groceries) first identify and estimate net expenditure on the good or service (i.e. after transfers between sectors within the economy). The next steps are to estimate direct value added and finally total value added (or net economic benefit). This analysis of net expenditure flows through the various sectors of the economy and estimation of direct value added is carried out using relevant economic models particular to the economy. The economic model also provides multipliers, which are measures of the impact across the whole economy of an expenditure in one sector. Multipliers reflect the contribution of an industry sector beyond the value it creates directly. For example spending in the retail sector may result in subsequent spending in the entertainment sector because retail employees spend part of their wages in cafes.

APPLICATIONS TO LIBRARY SERVICES

Economic valuations of library services are generally designed to provide a result that is specific to a particular time and place. For example, the study of the St Louis Library Services mentioned earlier (Holt et al 1998) was designed to indicate the value of the return produced for business, education and general users for every dollar of tax revenues expended in a particular fiscal year (a ratio of \$1: \$4 was demonstrated).

NON-MONETARY-TRADEABLE GOODS AND SERVICES

However the NBD/NUC is a "non-monetary tradable" – that is aspects of its services cannot be directly traded for money. This means many of the elements required to estimate economic value as outlined above are not available for the purpose.

An approximation to economic value can be obtained by treating resource cost as equivalent to net expenditure and, by applying appropriate multipliers drawn from the economic model, an estimate can be made of net economic benefit equivalent to those derived from traditional EIA methods..

However this is an incomplete measure and current national and international practice is to use the more comprehensive concept of "willingness to pay" to estimate "consumer surplus" for the good or service. In effect, consumer surplus is a measure of the value consumers place on a good or service over and above the price they pay for it.

This concept rests upon the standard micro-economic theory of the "rational consumer" (end-user in the case of the NBD/NUC) maximising utility by arranging their expenditure accordingly. If a quality improvement is made to the service they receive, without charge, then the consumer's utility for the same

expenditure will increase. The amount of money that a rational consumer would be willing to pay to achieve this lift in utility is the same as that which brings them back to their original level of utility. In other words the consumer would not distinguish between having the original service at their original expenditure, and paying extra money for the improvement.

This concept can be expressed in the following formula:

$$U(B, Q_0) = U(B-M, Q_0 + \Delta Q)$$

Where

- U = Utility,
- B = Budget (of consumer)
- M = Amount of money consumer is willing to pay for the improvement
- Q = base Quality of service
- ΔQ = Improvement in quality of service

This formula therefore defines the value M as an improvement in service. (ΔQ can be a single attribute or a "bundle" of attributes and M consequently represents the valuation of the whole improvement). In the context of the earlier discussion in this section, M is the consumer surplus.

The aim of an empirical valuation methodology should be to enable the estimation of the consumer surplus, the value M, in this analysis.

It is important to note that if the improvement made to service (ΔQ) is actually priced at its true value then the consumer's utility would be unchanged.

This theory has been expressed in terms of valuing an improvement in service quality. In the case of the NBD/NUC we are required to value the existing services (at least in the base situation). The theoretical approach is unchanged in these circumstances from that outlined above, although some adjustments need to be made to the practical methodology.

PRACTICAL TECHNIQUES FOR ESTIMATION

There are two primary methods for obtaining valuations of non-market attributes. These "stated preference" methods are referred to as Contingent Valuation (CV) and Stated Choices (or Conjoint Analysis)(CJ". Both techniques require surveys of end-users to estimate willingness-to-pay (WTP) – the value M in the above theoretical discussion.

CONTINGENT VALUATION

Contingent Valuation seeks a direct assessment of the end-users' willingness-to-pay. A contingent valuation survey asks respondents directly to indicate their willingness to pay for an improved service. The method attempts to replicate people's likely behaviour if a real market for the service existed. Theoretically it attempts to locate on the indifference curve an exact point corresponding to a particular service improvement (or bundle of improvements).

Although this method is analytically simple, it does have significant problems, including:

- Survey questions need careful formulation to convey correctly the specific improvements to which the interviewee is asked to respond.
- Ensuring the responses do fit along the indifference curve. This can be done by asking questions in the form *What is the most you would be willing to pay to gain an improvement of X?*, but problems of interpretation remain.
- WTP values and willingness to accept (WTA) compensation for a decline in service are not necessarily the same for the equivalent loss in utility. Some evidence exists that WTP values are usually lower than WTA values. Indeed Transfund New Zealand adopts the view in its Project Evaluation Manual (PEM) that WTA values should “be divided by 3 to get an acceptable value for use in project evaluation (PEM Section A8.1.5(a)(i)).
- Concerns that respondents may not treat questions of payment (or compensation) seriously because they may not in fact have to make payment.
- Possible inflation of WTP by respondents applying their current consumer surplus.

STATED CHOICE

As with contingent valuation, Stated Choice analysis seeks WTP values directly from respondents rather than inferring values from observations of people's behaviour. This approach has become the preferred one for non-market valuations because interpretation is less error-prone than Contingent Valuation. This technique assumes people make complex decisions using a range of criteria, rather than one, and presents a series of “pairwise” comparisons of product/service attributes for respondents to choose between combinations of attributes. Their choice is then assumed to have higher utility than other possible choices. By estimating utility positions revealed by respondents in relation to the indifference curve, we obtain a measure of the values they attach to the comparisons being offered, and ultimately the highest value choice.

This technique presents more technical difficulties in analysis than contingent valuation, but ensures greater respect for the underlying requirement of indifference and therefore enhances quality of results.

For these reasons we propose to use the Stated Choice method to value non-market attributes in this study.

1.4

RESEARCH METHODOLOGY

VALUING EXISTING PRODUCTS

The theoretical discussion in the previous sections shows that the practical application of both contingent valuation and Stated Choice techniques is most effective when used to evaluate changes relative to the current position.

In this study we are valuing existing products, which require no theoretical departures from the process outlined above, but which do need some practical adjustments in implementation. Effectively we have had to measure the change in utility (and hence value) of a hypothetical product against loss of the existing NBD/NUC product.

In outline, our approach consisted of :

- Specifying the alternatives
- Desktop research drawing on available financial data
- Structured, in depth interviews and Willingness to Pay surveys with librarians and end-users of bibliographic information
- Integrated economic evaluation

COLLABORATIVE RESEARCH

Essential to our approach to the economic evaluation of NBD/NUC was the recruitment of representative samples of libraries and end-users. This required collaboration from both the National Library and the libraries, which subscribe to Te Puna.

The National Library persuaded subscriber libraries to make senior librarians available for face-to-face interviews of up to an hour's duration. Co-operation from the libraries was needed and obtained in helping recruit users of reference and interloan services for a face-to-face survey of end-users. These interviews were of around 30 minutes duration.

Delivery of the survey was a collaborative effort with National Library staff trained by McDermott Miller interviewing the senior librarians, and the interviews of end-users conducted by interviewers from the McDermott Miller Market Research Unit.

FACE TO FACE INTERVIEWS

The surveys of librarians and end-users were conducted as computer-aided personal interviews (CAPI).

McDermott Miller's preferred survey approach is to conduct interviews as two-way exchanges of information. At the outset of the interview, and as necessary during its course, the interviewer ascertains the extent of the respondent's knowledge about NBD/NUC (and where necessary associated Te Puna subscriber services). If gaps in the respondent's knowledge are apparent which inhibit meaningful discussion and responses to questions, the interviewer provides the necessary background information in the form of standardised showcards (see section 2.1).

The survey sampled end-users of NBD/NUC. These are members of public, education, or specialist libraries who make searches of bibliographic databases. The searches may be made directly by the end-users themselves, but are usually "librarian mediated" ie a reference librarian performs a search at the request of the end-user.

End users are classified as:

- **Private** –users making searches for private, non-commercial purposes including private study
- **Professional** –users making searches for business, government, academic (non-student) or professional research purposes.

We interviewed a representative sample within each group.

STATED CHOICE QUESTIONNAIRE

We used a Stated Choice (conjoint analysis) survey technique to measure the intangible user values of NBD. The Stated Choice questionnaire was administered to end-users during the face-to-face interviews.

Stated preference questionnaires require respondents to choose between products or “profiles” consisting of combinations of attributes. The respondent chooses his/her preferred alternative. In some methods the respondent indicates the strength of his preferences; others require only the choice. Under the assumptions of the micro-economic theory of discrete choice, the respondent is assumed to choose the product/profile, which is of higher aggregate utility to them. If the experiments – the set of products/profiles presented to the respondent - are designed in a structured way, we can estimate the contribution to this utility from each of the products’ attributes. Some high utility attributes will have a major influence on determining the overall attractiveness of a product to a respondent.

Price is one of the attributes that can be included in a conjoint analysis/Stated Choice questionnaire. This makes it possible to estimate a demand curve.

1.5

GLOSSARY OF TERMS

To assist readers understanding of the report we prepared a Glossary of Terms used, which is contained a Table 1.1 below.

Table 1.1 GLOSSARY OF TERMS	
SURVEY METHODS	
CATI Survey	Computer-aided Telephone Survey i.e. a survey administered by computer, where interviewers read questions to respondents over the telephone.
Stated preference research	Research methodologies to determine people's preferences through systematically posing hypothetical questions to them. Contrasts with <i>revealed preference</i> methods in which preferences are inferred from people's actual behaviour.
Stated Choice or Conjoint Analysis	A Stated Choice research methodology involving asking respondent to rate "product profiles" (see below). Respondents' preferences for the attributes that constitute the product profiles are derived from these ratings.
CAPI Survey	Computer-aided Personal Survey i.e. a survey administered by computer, which the respondent interacts with directly.
Contingent Valuation	A stated-preference method of valuing non-market resources through direct elicitation of prices respondents are willing to pay for the service provided by the resource (See Section 1.3)
BENEFIT VALUATION MEASURES	
Attributes	Variables which characterise the variables which characterise the bibliographic search products ie accuracy, efficiency, price and availability.
Attribute levels	The " <i>Attribute levels</i> " are the values, which each attribute can take, as listed in Table 3.1 e.g. \$5 for the price attribute.
Product Profile	A (real or hypothetical) product defined as a combination of (in this case four) attribute levels - one level from each of attributes.
Utility	Measures of respondent's preferences for attribute levels, derived from regression analysis of ratings data. Average utility is the average, across the whole sample or a segment within the sample, of the individual respondents' utilities.
Span of Utility	The difference, within each attribute, between the lowest and highest utility values. Span of utility is a measure of the importance of an attribute to individuals or segments..
Percentage Span of Utility	Span of utilities scaled so they sum to 100% - used to identify the importance of the attribute as a whole in determining preferences.

NATIONAL LIBRARY TERMS	
National Bibliographic Database (NBD)	The National Bibliographic Database (NBD) contains bibliographic records with holdings - New Zealand's National Union Catalogue. The NBD also has recent (after 1990) bibliographic records without holdings from Library of Congress, the British National Bibliography (BNB) and National Library of Australia (Kinetic). It also contains Library of Congress Subject Headings and Name Authorities. Subscribers to Te Puna have access to NBD (from NLNZ website description)
National Union Catalogue (NUC)	National Union Catalogue (NUC) is hosted on Te Puna and represents the holdings of contributing New Zealand libraries. It is a subset of Te Puna National Bibliographic Database. The NUC supports the New Zealand Interloan Scheme – see below (from NLNZ website description).
Te Puna Interloan (Interloan)	Te Puna Interloan is a web-based interloan management system for the request and supply of resources between libraries (from NLNZ website description).
Te Puna Search (and Te Puna Online Search)	Access to the National Bibliographic Database, National Union Catalogue, Index New Zealand, and gateways to international library databases (from NLNZ website description).

2. SPECIFYING THE ALTERNATIVES

2.1 EVALUATION OF ALTERNATIVES

Central to our approach to valuing the National Bibliographic Database/National Union Catalogue is the comparison between the world *with* and *without* the NBD/NUC. The alternatives valued are:

- Existing NBD/NUC system (described in **Section 1.1**)
- Position if there was no NBD/NUC system

SCENARIO IF NBD/NUC CEASED TO EXIST

The alternative to the NBD/NUC was discussed in a workshop of Te Puna Support staff and the McDermott Miller study team. The workshop defined a scenario in which the NBD/NUC ceased to function. This scenario envisaged how reference searches would be performed, how the interloan system would function, and how catalogue records would be obtained without the NBD/NUC.

The workshop found that:

- In the absence of the NBD, bibliographic searches would be conducted (once a library's internal resources are checked) on a range of external catalogues, including other New Zealand libraries' OPACs and overseas bibliographic database such as OCLC, the Library of Congress and the British Library;
- In the absence of the NUC, searches on overseas bibliographic databases would have to be followed up by searches on New Zealand library's OPACs, to ascertain New Zealand holdings;
- Cataloguing records could be purchased from OCLC, Library of Congress, British Library etc;
- A centralised interloan system would be infeasible in the absence of the NUC; interloaning would be an ad-hoc process. Once information on New Zealand holdings was obtained via OPACs, borrowing libraries would have to contact each holding library in turn to check whether an item was available for interloan.

It is against this scenario that the benefits of the NBD/NUC can be measured. The total user benefit is the amount that the end-users of NBD/NUC are willing to pay for the current bibliographic search and interloan service based on NBD/NUC over and above the value to them of the degraded service described in the scenario.

SHOWCARDS FOR SURVEY OF END-USERS

The existing NBD/NUC bibliographic searching system, its associated interloan system, and the alternatives to these, were explained to respondents to the end-user survey in the showcards presented in figures 2.1 to 2.4 below. These explain and contrast the two alternative scenarios – ie with and without NBD/NUC.

**Figure 2.1:
SEARCHING AND BORROWING WITH THE TE PUNA ELECTRONIC ACCESS CAPABILITY WITH NBD/NUC**

Te Puna is the gateway to the National Bibliographic Database and National Union Catalogue, the “one stop shop” for searching for reference materials within and without New Zealand.

It links the various strands that can be searched for archived materials. Using the one interface of Te Puna a user can search through different databases that list holdings throughout New Zealand and major international catalogues, it even has listings for libraries that do not have an online catalogue. Furthermore, a single search can be conducted through all these databases at once. This produces highly consistent and accurate listings of item holdings throughout New Zealand and the world.

Linked with its national interloan service, Te Puna can identify where particular items are held, allow the user to request the item by loan (from any library in New Zealand) and then place the request with library best placed to fulfill it, and all in a matter of minutes. It is also possible to request items from libraries outside New Zealand.

Interesting facts about Te Puna:

- You can find holdings across 95% of New Zealand libraries including university, other tertiary, research, public, and other special libraries within New Zealand.
- Also, you can search across multiple international databases that have listings of all recently (after 1990) published English language material. This includes the Library of Congress, the British National Bibliography (BNB) and National Library of Australia (Kinetica).

Using this system you can link to the Te Puna interloan, an automated Inter library loan/ document delivery system. This process can do the following:

- locate simultaneously an item at all holding libraries;
 - request an item from the most appropriate source;
 - route this request to all other holding libraries if the first is unable to supply;
 - monitor the request at all points in the process; and,
 - invoice automatically on a monthly basis (rather than item by item).
- This system minimises the time it takes for a requested item to be received (7 days on average).
 - The workload of the system is shared among all of New Zealand’s libraries and even those without an internet presence.
 - Library customers directly without the need for a professional librarian acting as an intermediary can use it.

Figure 2.2:**SEARCHING AND BORROWING *WITHOUT* THE TE PUNA ELECTRONIC ACCESS CAPABILITY WITH NBD/NUC**

Searching without the Te Puna gateway to the National Bibliographic Database and National Union Catalogue can be a time consuming and difficult task. There would be no "one stop shop" for searching for reference materials within and without New Zealand.

Users would have to conduct individual searches of each library catalogue, limited to those they could access online. Each catalogue would have to be searched separately, and each could produce wildly disparate results, as there would be no guarantee of consistency across the searching programmes. Because of this an inexperienced user would probably need close assistance from professional librarian.

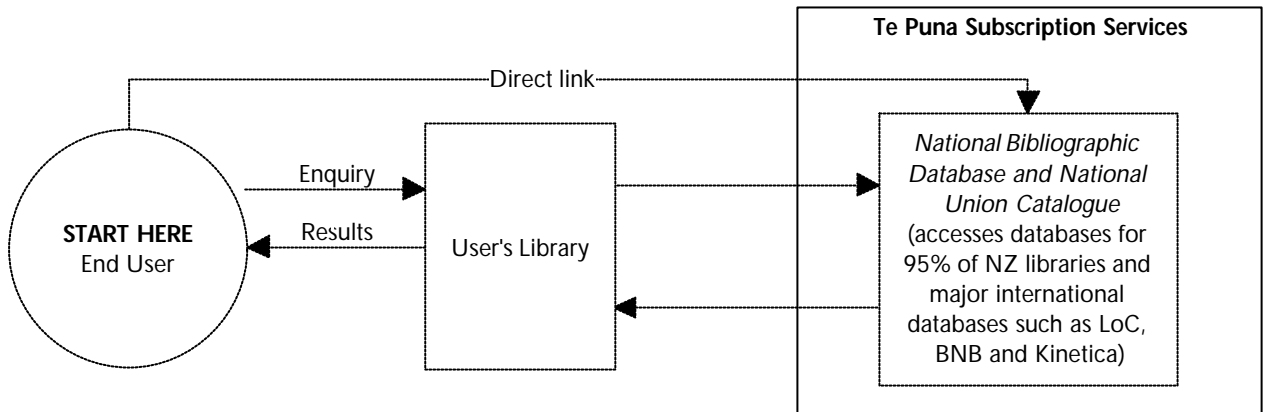
Once a user has located an item they wish to borrow, there is no guarantee that they will be able to do so. Without a national interloan service the user would have to rely on their own library's ability to negotiate an interloan from another library, or failing that, their own personal ability to convince the out-of-town library to lend them the item. The cost of this type of interloan could also be very high.

A similar would apply to obtaining an interloan from an overseas library.

To locate resources without the Te Puna system could involve:

- Performing sequential searches in each individual library catalogue and only on those libraries with an internet presence;
- Searches for recently published items not held in New Zealand would have to be conducted on separate international databases;
- If you wanted to borrow the item, you would have to deal directly with that library and make the borrowing according the lending policy of each library; and,
- Items to be borrowed would be limited to those within New Zealand, unless you were prepared to undergo the added time and cost of locating an international resource available for loaning to you.
-
- Loaning an item from another library would be an entirely ad hoc process with each step of the process (requesting, receiving and charging) being performed on an item-by-item basis at each individual library.
- End-users would not be able to access the system or make an interloan request without a librarian acting as an intermediary.
- Most of these interloans would fall on those libraries with an internet presence, in terms of both workload and wear and tear on materials. This could lead to a greater interloan costs for those libraries the borrow but do not lend.

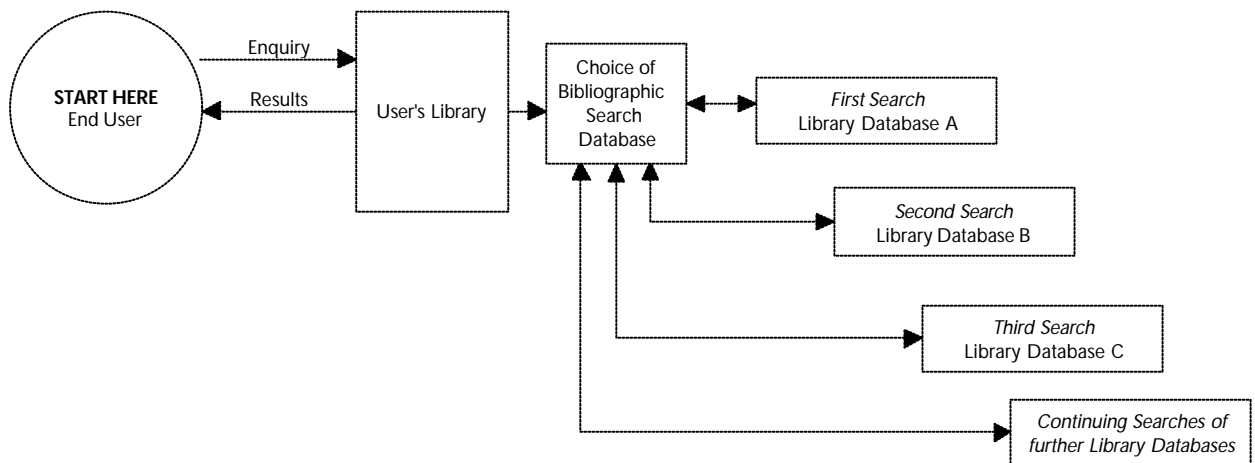
Figure 2.3:
Searches *with* Te Puna



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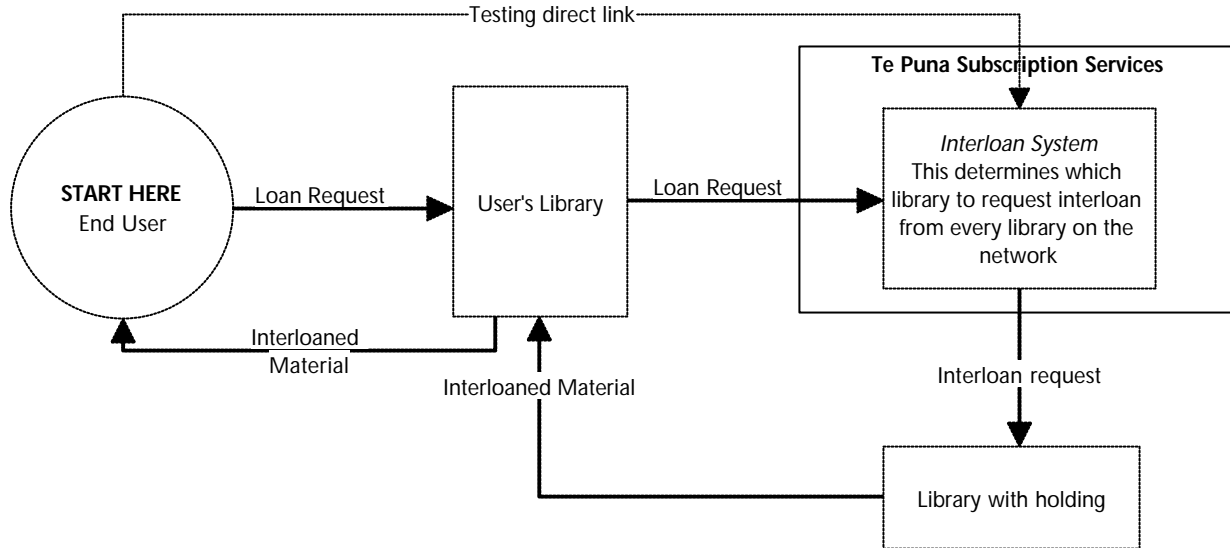
Searches *without* Te Puna

Sequential searches of different library databases and results passing between user's and database supplier libraries



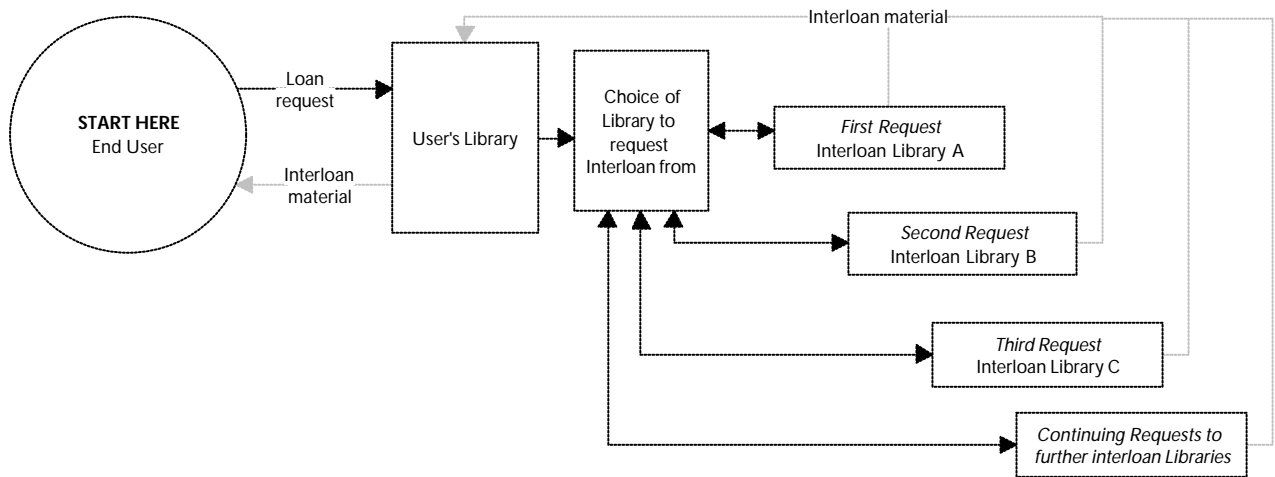
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Figure 2.4:
Interloans *with* Te Puna



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Interloans *without* Te Puna
Sequential requests of different libraries for interloan material



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2.2

CURRENT USAGE OF NATIONAL BIBLIOGRAPHIC DATABASE**ANNUAL SEARCHES**

Data derived from the Te Puna Usage Reporting system indicate that in round terms there are 2,000,000 runs per year on NBD/NUC. Assuming 2 runs are made for each search enquiry, it can be concluded that approximately 1,000,000 searches are made per year.

ESTIMATED USERS BY TYPE

No data are available concerning the number of **end users** of NBD/NUC as distinct from the number of times it is used per year. It is necessary to estimate the number of end users in order to:

- indicate the current market penetration of NBD/NUC
- Project NBD/NUC use under various scenarios.

Analysis of our survey of end users indicates that private users make about 10 searches per year (total of librarian mediated and direct personal searches). Professional users make over four times more searches totalling around 45 searches per year.

Assuming 25% of users are professionals, and 75% private, we estimate there are a total of 5354,000 end-users of NBD/NUC making around 1 million searches per year. Of these:

- 40,000 are private users making around 400,000 searches per year in total; and,
- 13,300 are professional users making around 600,000 searches per year in total.

2.3

PROJECTION OF FUTURE USE OF NBD/NUC

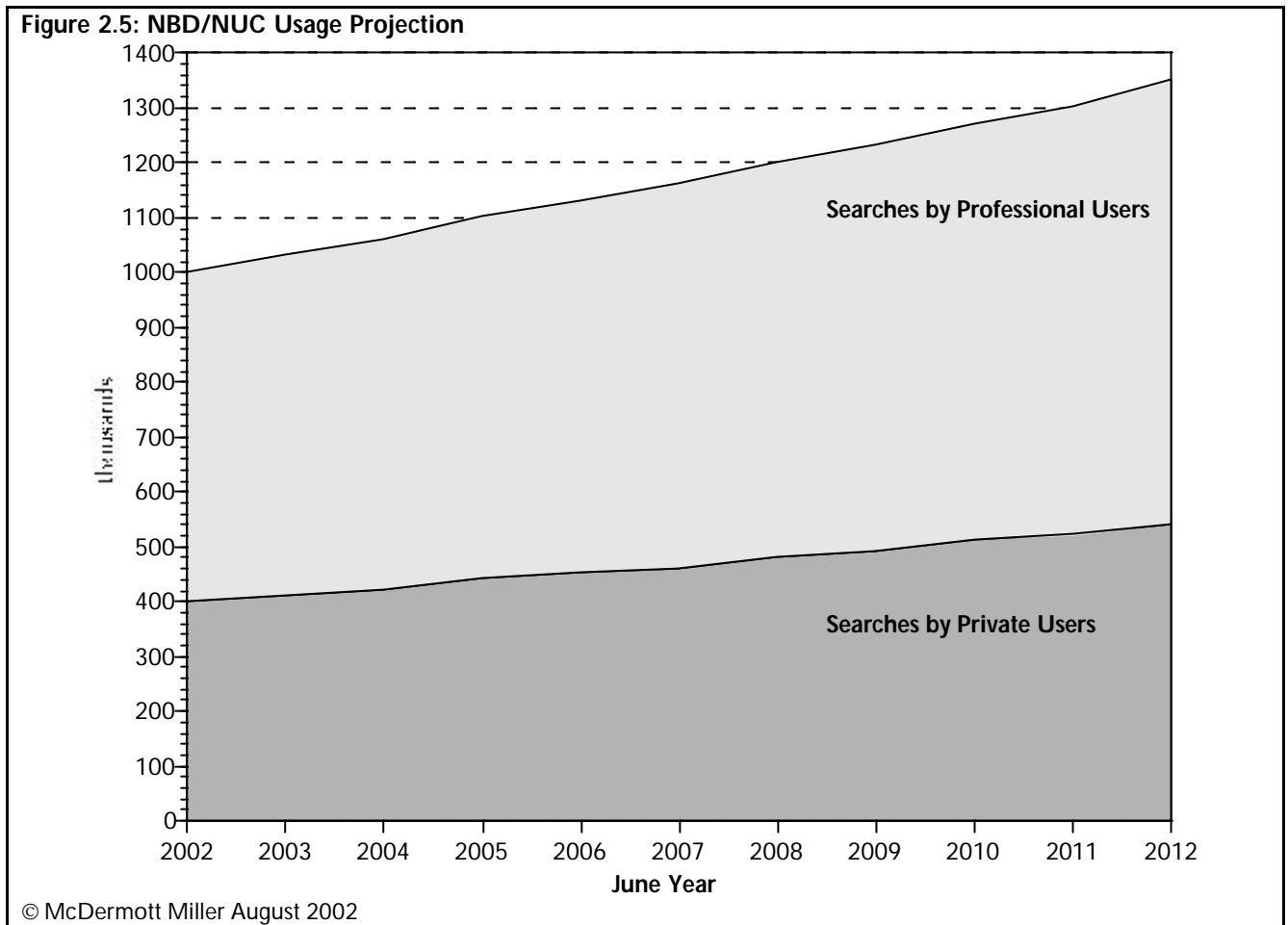
Our projection of future use of NBD/NUC, assuming no change in product offer or charging policy, is based on current growth trends.

Data on NBD/NUC searches is from the Te Puna Usage Reporting system OLAP cube. Last year growth in searches was around 3%.

We assume that annual growth of searches on NBD/NUC will remain constant at 3% over the evaluation period.

Search projections prepared on this basis are presented in **Figure 2.5** (over), which shows:

- There will be 1.3 million searches by 2012, - 540,000 by private users and 810,000 by professional users.



In the following sections, we use these projections of future use as the basis for valuing the benefits produced by the NBD/NUC.

3. VALUATION OF BENEFITS OF NBD/NUC

3.1 USER VALUES

METHOD

Consumer surplus measures the value consumers' place on a good or service over and above the price they pay for it. We use the concept of "willingness to pay" to estimate "consumer surplus" for the good or service.

As noted above, this concept rests upon the standard micro-economic theory of the "rational consumer" (end-user in the case of the NBD/NUC) maximising utility by arranging their expenditure accordingly.

Consumer surplus is usually conceived in terms of willingness to pay for an improvement in service quality. It can also be considered as willingness to accept compensation for a degradation in service quality or willingness to pay to restore the status quo level of service quality from a state of degraded service quality.

We have carried out a Stated Choice survey of NBD/NUC end-users in which they were presented with a series of "pairwise" comparisons of search products. The search products are defined as combinations of the attribute levels in Table 3.1 below:

ATTRIBUTES OF BIBLIOGRAPHIC SEARCHES

A workshop was organised to identify the attributes (See glossary of terms section 1.5) of bibliographic searches. Participants were staff of Te Puna Support and members of the McDermott Miller study team.

Seven attributes were identified as relevant to the quality of on-line bibliographic searches. These were:

- Cost
- Time to find item
- System Reliability
- Range/Comprehensiveness (% of cover of NZ library's collections)
- Accuracy – (Probability of achieving desired search result)
- Availability of the item (time to find confirmed order)
- Usability (Ease of operation)

Following questionnaire development and pilot testing, four attributes were distilled for use in the Stated Choice survey. These were

- Accuracy
- Efficiency –ie time taken
- Price for searches
- Availability

The levels” (i.e. range of values) of each of these attributes are listed in Table 3.1.

Table 3.1: Attributes of Searches Used in Stated Preference Questionnaire – Private Users

Accuracy	Efficiency	Price for searches	Availability
1 High Accuracy	Search through 80%+ of NZ library holdings in 2 minutes	Price for search \$0	Interloan availability verified immediately after item located
2 Low to Medium Accuracy	Search through 70% of NZ library holdings in 2 hours	Price for search \$2	Interloan availability not verified for up to 1 week
3	Search through 50% of NZ library holdings in 31 minutes-1 hour	Price for search \$5	No effective interloan system
4	Search through 25% of NZ library holdings in 15	Price for search \$10	
5	-	Price for search \$20	

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 Note: The same levels of attributes of access, efficiency and availability were tested for professional users, but the price (or searches attribute was \$5, \$10, \$20, \$50 and \$100.

In total therefore Table 3.1 shows 14 levels across 4 attributes were tested.

In the workshop of referred to in section 2.1, Te Puna librarians informed the McDermott Miller study team that Te Puna’s end users divide into two broad segments – Private users (the general public) and professional (chiefly business and academic) users. The first group we have termed “private” users, the second “professional”. We believed that professional users would have a higher willingness to pay for searches on NBD/NUC than private users (as evidenced by the existence of “added-value” reference search services run by major public libraries for business customers) and so used, for professional users, a price scale with a high upper bound (\$100 vs \$20 for private users) in order to capture this.

UTILITY OF BIBLIOGRAPHIC SEARCH PRODUCTS

Analysis of the responses to the CAPI Stated Choice survey yields *utilities* for the attribute levels.

The *utilities* of attribute levels measure their importance in determining preferences. Utilities are derived from regression analysis of the data on preferences collected in the Stated Choice survey. Average utility is the average of the individual respondents’ utilities across the whole sample or a segment within the sample.

There are 120 possible “product profiles” of reference search products that can be defined, using all possible combinations of the 4 attributes with their total of 14 levels of Tables 3.1 (these are listed in Tables AII.3 and AII.4 in Annex II). Utilities of these for each respondent are calculated. The product profile, which most closely resembles the current NBD/NUC online search product, is:

- High Accuracy;
 - Search through 80%+ of NZ library holdings in 2 minutes;
 - Price for search \$0; and,
 - Interloan availability verified immediately after item located;
- has the highest average utility.

ESTIMATING WILLINGNESS TO PAY

We estimate the consumer surplus associated with the current NBD/NUC service to be: *the amount consumers would be willing to pay for the current service if they were faced with a choice between it and the degraded service for searching and interloaning that they would encounter if NBD/NUC did not exist.*

The *current NBD/NUC* service can be described as:

- High Accuracy
- Search through 80%+ of NZ library holdings in 2 minutes
- Interloan availability verified immediately after item located

The *degraded (no NBD/NUC)* search service matches the product profile:

- Low to Medium Accuracy
- Search through 50% of NZ library holdings in 31 minutes-1 hour
- Interloan availability not verified for up to 1 week
- Price for search \$0

Setting aside price, the *current service* has a much higher utility for private users than the *degraded service*. The *current service* is perceived to be the superior product, but as the price for the *current service* increases its utility shifts down towards that of the *degraded service*.

Models have been built which estimate, for each individual respondent, the price (for the *current service* compared to the *degraded service*) at which they are indifferent between the *current* and the *degraded service*. This represents each individual's maximum *Willingness to Pay* for the existing NBD/NUC service.

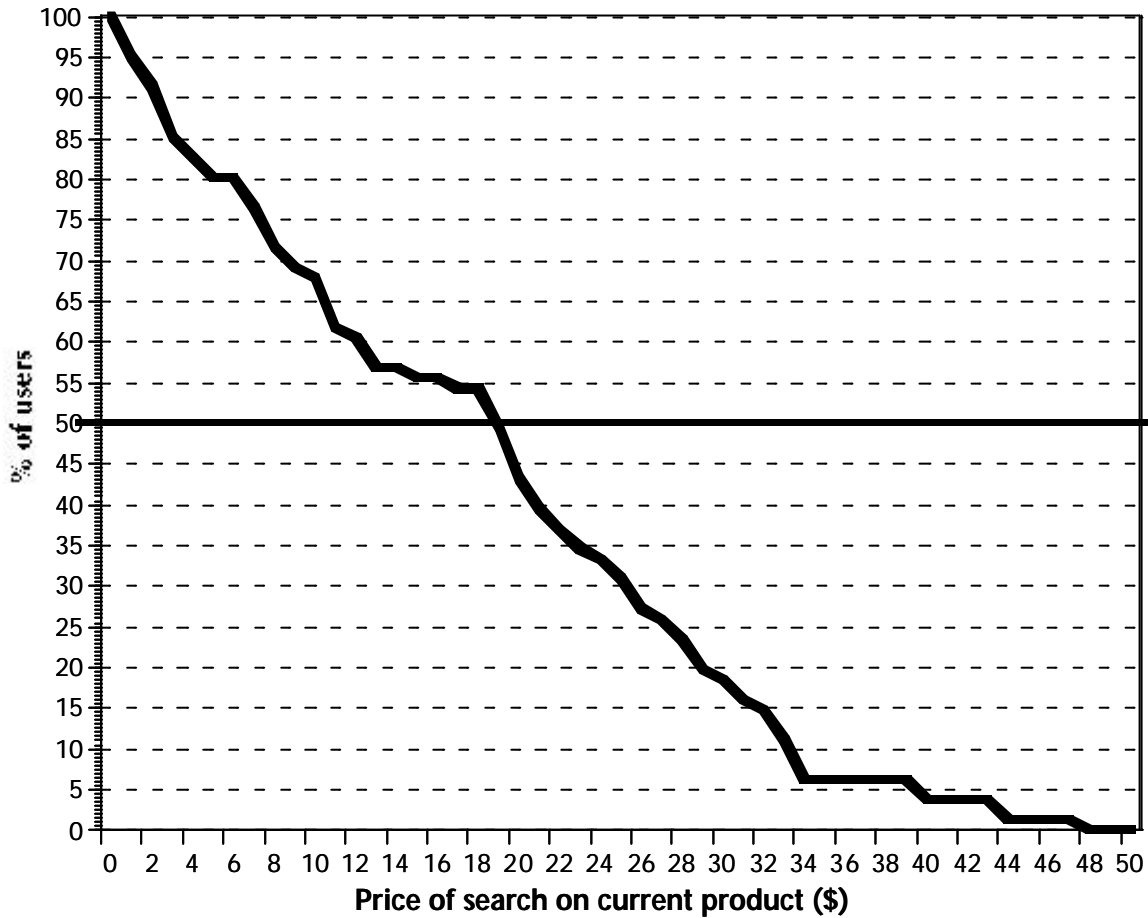
USER WILLINGNESS TO PAY RESULTS

Figure 3.1 (over) shows the percentage of Private User respondents who prefer the *current* (superior) NBD/NUC service over the *degraded service or products*, as price for the *current product* increases. At a price of \$10 per search on the *current product* for example, 70% of private users would still prefer it over the *degraded product* for \$0.

The price for the *current search service* at which 50% of users would prefer it over the *degraded product* is \$19. This is our estimate of “average” WTP for the private users.

Estimated WTP for many private users is greater than the \$20, upper limit of prices presented in the interviews. Since extra polated estimates are not necessarily reliable, we are on stronger ground using the median measure of WTP rather than a mean measure, (estimating median value only requires certainty that users' WTP is greater than \$20; a precise estimate of WTP is not essential to the calculation).

Figure 3.1: Cumulative % Willingness to Pay for Current NBD/NUC: Private Users

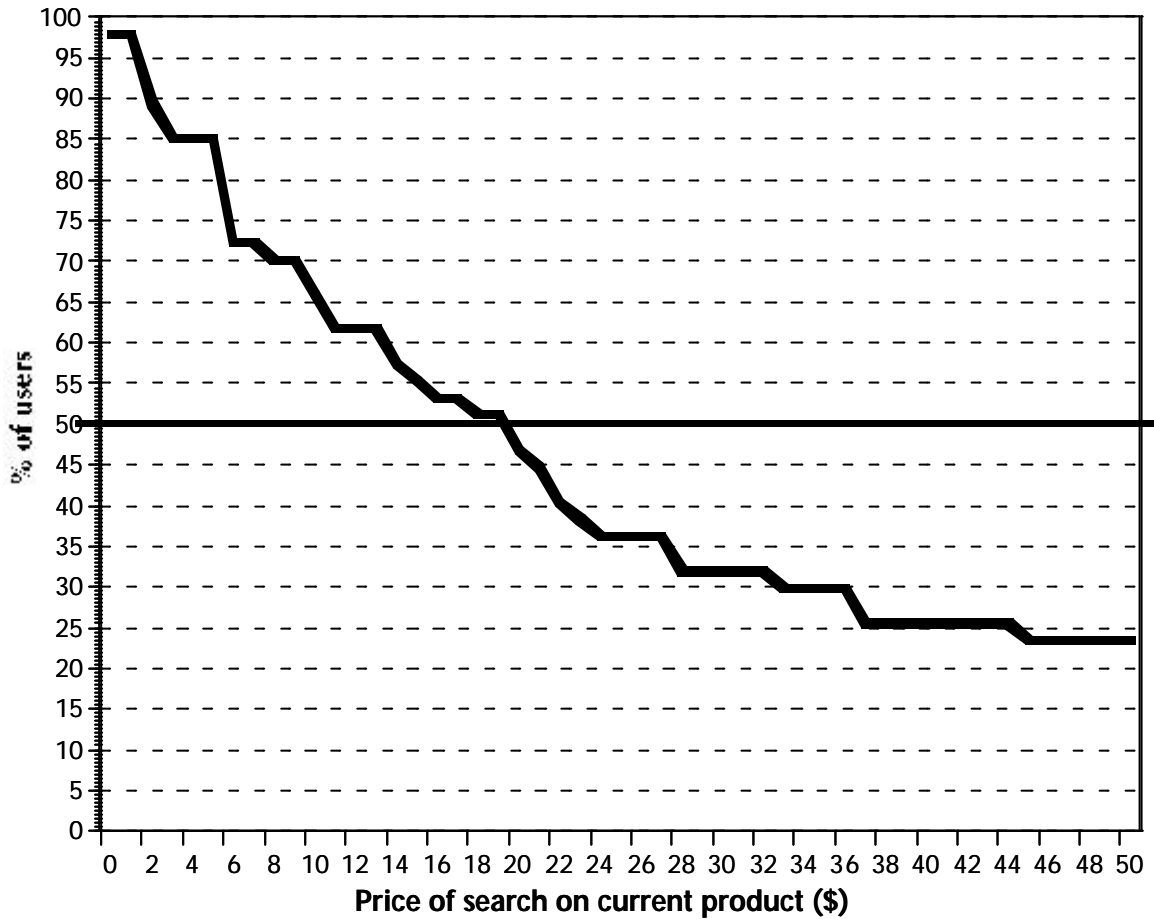


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Figure 3.2 (over) shows the percentage of Professional user respondents who prefer the *current* (superior) NBD/NUC over the *degraded products*, as price for the *current product* increases. (Prices shown are over and above the \$5 used as the price for the *degraded product* in the product preference simulations).

The median WTP for private users is \$19 and for professional user respondents is \$20 per search.

Figure 3.2: Cumulative % Willingness to Pay for Current NBD/NUC: Professional users



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Note: Price shown is difference from \$5

USER BENEFIT STREAM

Projections of user benefits are presented in Table 3.2. These are calculated by combining WTP per individual end user (private user \$19, professional user \$20) with the projections of users in Figure 2.5.

- Annual benefits are projected to rise from today's \$20 million to \$26 million in 2012.

Table 3.2: Projected User Value Benefit Streams by Scenario (\$M)

	Private	Professional	Total
2002	7.6	12.0	19.6
2003	7.8	12.4	20.2
2004	8.1	12.7	20.8
2005	8.3	13.1	21.4
2006	8.6	13.5	22.1
2007	8.8	13.9	22.7
2008	9.1	14.3	23.4
2009	9.3	14.8	24.1
2010	9.6	15.2	24.8
2011	9.9	15.7	25.6
2012	10.2	16.1	26.3
2013	10.2	16.1	26.3
2014	10.2	16.1	26.3
2015	10.2	16.1	26.3
2016	10.2	16.1	26.3
2017	10.2	16.1	26.3
2018	10.2	16.1	26.3
2019	10.2	16.1	26.3
2020	10.2	16.1	26.3
2021	10.2	16.1	26.3
2022	10.2	16.1	26.3
2023	10.2	16.1	26.3
2024	10.2	16.1	26.3
2025	10.2	16.1	26.3
2026	10.2	16.1	26.3
2027	10.2	16.1	26.3

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 Source: McDermott Miller Estimates

ESTIMATE OF LIBRARIES’ PRODUCTIVITY LOSS

McDermott Miller estimated the resource saving to libraries that access to NBD/NUC provides them, compared to the situation if NBD/NUC, and consequently other Te Puna subscriber services, are withdrawn.

If NBD/NUC is closed down libraries of all types will incur extra costs because of the extra time reference searches will take. This is a tangible national resource cost, borne by all libraries not just the National Library.

McDermott Miller, in consultation with Te Puna Support, designed search tests to be carried out by reference librarians. This involved a series of reference enquires to be answered either by:

- Using NBD/NUC
- Using another source or sources of bibliographic information, which in the judgement of the subject, is the best alternative approach.

Of these, the first used to answer each reference question is decided at random.

Te Puna Support staff administered three experiments in Auckland, Wellington and Dunedin. Of these, two provided usable results.

Analysis of the results of the experiments indicate that:

- Searches on alternatives take longer than NBD/NUC; and the extra time taken ranges widely.
- The searches carried out using the alternatives are of much lower quality than those carried out on NBD/NUC.

Librarian respondents were not prepared to put in the large amount of time using other databases that would be required to offset the loss in quality (if indeed that is possible), although some extra time is spent.

The *Survey of Reference Librarians* (McDermott Miller August 2002) found that reference librarians spend, on average, around 17 minutes on reference enquiry, of which 11 minutes is on tasks which depend on the search engine (or engines) being used. The reference librarian respondents estimated that the time required for the search-engine dependent stage would double if Te Puna search is discontinued, i.e. searches would take another 11 minutes each, on average.

On this basis, and assuming the resource cost of a librarian's time is \$20 per hour, an approximation of the resource cost to the libraries of the additional time spent is \$4 million per year (or around \$40 million Net Present Value for the 25 year project period).

The loss in value associated with the loss in quality is incorporated in the end-users' willingness to pay, presented in Table 5.4. This is separate from the loss of productivity incurred through increased average librarian time to search without the NBD/NUC electronic bibliography service.

3.2

EXISTENCE VALUE

"Existence value: is the value the people place on the existence of a resource, even when they have no intention of ever using it."

Refer *Valuing our Recorded Heritage*, by EFTEC for (U.K) Council for Museums, Archives and Libraries (2001)

Willingness to Pay for Existence of NBD/NUC

We have conservatively confined our estimates of existence value to NBD/NUC users only, and have not allowed for non-users or potential users:

We estimate there are around:

- 40,000 private users making around 400,000 searches per year in total
- 13,000 professional users making around 600,000 searches per year in total.

Respondents to the end-user survey were asked:

What is the maximum that you would be prepared to pay per year through a special dedicated tax or levy to ensure the Te Puna Online Search and its associated national interloan service continues in existence and you have the option of using it for personal searches in the future.

Excluding outliers, the mean Willingness to Pay for the *existence* of NBD/NUC is \$13 for public users and \$33 for professional users. The *existence value* if the NBD/NUC's estimated to comprise \$520,000 per year from private users and \$440,000 from professional users, producing a total of **\$960,000**.

4. COSTING THE NBD/NUC

4.1 COSTS ASSESSED

For the purposes of economic valuation, the cost of the NBD/NUC has been assessed in terms of direct costs (those attributable directly to the National Library), and indirect costs (those borne by intermediate users in the course of maintaining and delivering the access benefits of the NBD/NUC to end users).

The estimation of these costs is outlined below.

4.2 DIRECT COSTS

Costs borne by the National Library in establishing, maintaining and delivering the services of the NBD/NUC are direct costs that should be taken into account in the economic valuation of the NBD/NUC.

Direct costs have been estimated from the National Library's financial data for year ended 30 June 2001, adjusted by eliminating transfers between the relevant cost centres within the National Library. For example, the capital charge and depreciation on fixed assets are transfers and as such are excluded.

At the outset of this project the National Library was unable to provide details of the costs of NBD/NUC because their accounting system could not identify and allocate costs appropriately. The National Library later commissioned Deloitte Touche Tohmatsu to devise a cost allocation model. The present analysis draws on Deloitte's 14 October 2002 version of cost estimates.

Initial Approximation

As an interim measure while awaiting the Deloitte's cost data, we made an approximation of direct costs based on the National Library's financial statements for the year ended 30 June 2001 using the following twostep process:

- adjusting total operating costs by excluding capital charges and depreciation,
- allocating the adjusted operating costs to NBD/NUC by multiplying them by the ratio of full-time employment equivalents (FTE's) employed in NBD/NUC Te Puna Access Services to the total National Library FTE's and rounding the result to the nearest \$100,000.

This method produced an initial estimate of \$2.8 million per annum as the relevant direct cost of NBD/NUC.

Final Estimate

Interim and further versions of the Deloitte Touch Tohmatsu cost allocation model subsequently became available. By identifying the relevant cost centres within Deloitte's analysis and adjusting for transfers and other resource

expenditures to reflect national economic costs we obtained an estimated direct cost of NBD/NUC of \$3.6 million per year on the base of Deloitte's 14 October 2002 model.

These estimates are summarised in the following Table 4.1.

Table 4.1 Estimates of Annual Economic NBD/NUC Direct Costs

	Cost (\$'million)
Initial approximation	2.8
Deloitte's model basis	3.6

Source: Deloitte Touche Tohmatsu, McDermott Miller

We have adopted \$3.6 million as our estimate of annual direct costs of NBD/NUC for the purposes of this study.

Costs have been assumed to grow by 2% compound pa over the twenty-five year horizon of the research study.

4.3

INDIRECT COSTS

Indirect costs, (costs incurred by intermediate users for the NBD/NUC), comprise costs incurred in all the public, educational and specialist libraries using the NBD/NUC. This financial data is unavailable in a form that would allow a detailed estimate. We have therefore estimated indirect costs using the published cost analysis of the CONZUL group as a basis for our estimate as follows:

- we identified costs applicable to NBD/NUC and adjusted them for transfers (eg subscriptions paid to the National Library),
- we then rated the resulting CONZUL costs by its proportionate use of the NBD/NUC to obtain an estimate for all intermediate users costs.

The resulting estimate of indirect costs for year ended 30 June 2001 was \$3.4 million per annum.

Again costs were assumed to rise by 2% compound per annum over the twenty-five year horizon of the study.

4.4

TOTAL COSTS

These estimates of direct and indirect costs were combined to give an **estimate of total costs of \$7 million pa**, increasing at 2% pa compound as shown in the following Table 4.2.

Table 4.2: Total Annual Economic Costs of NBD/NUC for Economic Valuation Purposes

	Cost (\$'million)
Direct	3.6
Indirect	3.4
TOTAL	7.0

Source: McDermott Miller

5. TOTAL ECONOMIC VALUE

5.1 INTEGRATED ANALYSIS

This section of the report brings together the benefits and costs of the NBD/NUC to complete an estimate of the value it adds to the national economy. This estimated value is referred to as the "Total Economic Value" of the NBD/NUC.

5.2 VALUATION APPROACH AND METHODOLOGY

BENCHMARK STUDIES

No comprehensive economic valuation of library services has been made in New Zealand. The relatively few international valuations of library services have used a range of models, such as those listed below:

- the Optimisation Model – a cost-effectiveness model designed to illustrate underlying economic features, but which has relatively low statistical precision; and,
- the Benefits Generated Model – a model of benefits generated by a library service using proxy values for the service (for example a number of searches may be obtained but the value per search is notionally estimated).

VALUATION OF NON-MARKET SERVICES

The key factor influencing choice of a valuation model for NBD/NUC is that the services being valued are non-market services. Although the access benefits provided by the NBD/NUC are currently "sold" by the National Library to intermediate users (public libraries, secondary and tertiary education libraries and other specialist libraries) who pay a subscription for access (\$?? million pa), the National Library's charges are based on its notional marginal cost of providing the services, rather than the full cost of doing so. Furthermore intermediate users' pricing to end-users in turn is varied and unrelated to any market for the services provided by NBD/NUC.

In other words, no market price exists for NBD/NUC access services. They are therefore *non-market services*.

Accordingly we have to value NBD/NUC services using techniques specifically developed to value services, which do not have a market price.

Although the Optimisation and Benefits Generated valuation models have been used elsewhere, their reliance on estimates of relevant data derived from assumptions about relationships with proxy values limits their statistical robustness and potential value .

The alternative model for estimating economic benefits, which we have used is the widely accepted and applied consumer surplus model.

CONSUMER SURPLUS

The theory of consumer surplus is based on evidence that consumers (end users in this instance) are willing to pay more than the market price or the non-charged cost of a product or service. The difference between what they would have been willing to pay for the service and the actual cost of providing it is referred to as the "consumer surplus." It is widely used as an indicator of the value of economic services.

APPLICATION TO NBD/NUC ECONOMIC VALUATION

The estimation of consumer surplus based on a use value utilises Stated Choice analysis of surveys of end-users to ascertain their Willingness-to-Pay (WTP) for their use of NBD/NUC services (expressed in dollars per search). The mean WTP therefore measures the average value of benefits of the NBD/NUC to end-users. By applying the derived end-user's mean WTP for the benefits they perceive to all end-users we obtain an estimated total annual WTP. This value is expressed in dollars representing the component benefit stream in the estimate of users' consumer surplus.

Costs of NBD/NUC access services are separately derived from data provided by the National Library and intermediate users and become the cost stream component in the estimate of users' consumer surplus.

In other words, the value of the benefits of NBD/NUC (derived from WTP of end-users) less the cost of those benefits (net costs borne by the National Library and intermediate users) is the consumer surplus.

A similar method is used to estimate the consumer surplus for the existence value of the NBD/NUC. The survey of end-users isolates the mean WTP for continued existence of NBD/NUC, irrespective of and additional to current use, and therefore the existence value benefit stream. There are no costs to be set against this benefit stream so the consumer surplus on account of existence value is its derived WTP benefit stream.

Applying a social time preference factor to the benefit and cost streams of the NBD/NUC estimated in the consumer surplus analysis generates an estimate of its net present value (in 2002 dollars). This is the Total Economic Value of the NBD/NUC

This approach is consistent with the practical models widely used in government evaluations at the present time.

5.3

WHAT IS VALUED

This study values access to the NBD/NUC through *Te Puna* as these services existed and were used in the year ended 30 June 2002. The services encompassed by this valuation include:

- National Bibliographic Database ("NBD"), and
- National Union Catalogue ("NUC"), and
- *Te Puna* Interloan

The estimated value excludes:

- Any value of any collection held by the National Library (ie no account is taken of the value of the National Library’s collections, including the Alexander Turnbull Library Collection), or by any subscriber to the National Library’s services (eg excludes value of university and public library collections).
- Universal on-line or schools access through the *Te Puna* website.

Service quality is assumed to be constant in the future (eg intermediate users continue to support the NBD/NUC through provision of new and updated MARC and holdings records).

The estimated value of the NBD/NUC as it now exists is measured against a basic alternative of the NBD/NUC ceasing to function entirely, with consequent loss of facility for end-user searches, degrading of the interloan service and loss of catalogue recording.

5.4

COMPONENTS OF THE CONSUMER SURPLUS

The outline of methodology above shows the key components of the estimate of consumer surplus to be:

- Mean WTP for use and continued existence (i.e. use value per search and existence value per user)
- Number of users and number of searches
- Economic costs of providing the NBD/NUC

Derivation of mean WTP values is reported in Section 3 above along with the estimated number of users and searches they make. These results are summarised in the following tables:

Table 5.1 estimated Mean Willingness to Pay

User Class	Mean Willingness to Pay	
	Use Value Per Search (\$)	Existence Value Per Annum (\$)
Private	19	13
Professional	20	33

Source: McDermott Miller

Table 5.2 Estimated Split of NBD/NUC End-Users and Searches by Private /Professional

	Private	Professional	Total
Split of Users (%)	75%	25%	100%
Searches per Year per User	10	45	
Estimated Users	40,000	13,300	53,300
Estimated Searches	400,000	600,000	1,000,000

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Source: McDermott Miller estimates

Note that, as explained in Section 2 above, end-users have been classified as private and professional users to reflect their different use characteristics.

Table 5.3 below summarises the costs (direct and indirect) of the NBD/NUC as it now exists (and repeats Table 4.2).

Table 5.3: Estimated Total Annual Costs of NBD/NUC

	Cost (\$'million)
Direct	3.6
Indirect	3.4
TOTAL	7.0

Sources: Deloitte Touche Tohmatsu, National Library, CONZUL group
Notes: Costs estimated for 30 June 2002 year

5.5

TOTAL ECONOMIC VALUE

Total Economic Value, measured as net present value of the consumer surplus estimated from the above components is estimated to be \$160.6 million.

This estimated value is summarised in the following Table 5.4

Table 5.4 Estimated Total Economic Value of NBD/NUC as at 30 June 2002

	Gross WTP \$'million	Direct Costs (NLNZ) \$'million	Indirect Costs (intermediates) \$'million	Net benefits WTP \$'million	Net Present Value (NPV) \$'million
Use Value	645.5	109.3	103.4	432.8	151.5
Existence Value	24.0	0.0	0.0	24.0	9.1
TOTALS	669.5	109.3	103.4	456.8	160.6

Source: McDermott Miller

If the NBD/NUC ceased functioning almost all this value would be lost. Based on our understanding of the residual services possible in this event, and the indicated costs of them we believe **loss of the NBD/NUC would cause the loss of around \$160 million in net present value**. That is a loss to the national economy of around \$160 million.

An alternative way of expressing the economic benefits and costs of the NBD/NUC is to do so in terms of a benefit-cost ratio. This ratio measures the net present value of the NBD/NUC stream of benefits as a multiple of the net present value of its corresponding stream of costs.

The benefit cost ratio for the NBD/NUC using the data analysis of this study is 3.1 to 1. In other words the net present value of every dollar expended in providing the NBD/NUC currently generates a benefit of 3.1 times that cost.

5.6

SENSITIVITY TESTS

The estimated Total Economic Value of \$160.6 million has been tested against changes in the key components of mean WTP, number of users and number of searches and cost. The sensitivity of the estimate against representative changes in all four components are summarised in the following Table 5.5 (over).

Table 5.5 Sensitivity Tests- Summary Results

Component	Change	Effect on NPV \$'million	Effect on NPV % of valuation
Users	+/- 1000	4.2	2.6
Mean WTP	+/- \$1	11.6	7.2
Searches	+/-10000	2.3	1.4
Cost	+/- \$100000	1.1	0.7

Source: McDermott Miller

This analysis shows **one thousand more users** using the NBD/NUC as the current users do, **will lift Total Economic Value by \$4.2 million**, or 2.6% of the current estimated value of \$160.6 million.

Similarly **10000 more searches per annum will lift total economic value by \$2.3 million**, or 1.4%.

The effect of a **5% shift in users, searches or mean WTP is to lift Total Economic Value by \$11.6 million** or around 7.2% of Total Economic Value of \$160.6 million. However a **5% increase in costs would only reduce Total Economic Value by \$3.3 million** or around 2.1%.

The estimate, therefore, is less sensitive to cost changes than it is to changes in the other components.

These tests show the estimate of \$160.6 million to be robust in the circumstances of the Study.

6. FURTHER RESEARCH

The evaluation of National Bibliographic Database and National Union Catalogue research project has indicated the potential for increasing the contribution the NBD/NUC makes to New Zealand's social, cultural and economic welfare. Research and development initiatives which have potential realise and possibly increase, these benefits, include:

- Determining what enhancements should be made to each of the attributes of NBD/NUC:
 - Accuracy
 - Access
 - Usability (an issue if access is widened so that more end-users uses NBD/NUC directly)
 - Interloan service

Prioritisation of enhancements should be on the basis of surveyed value to users (indicated by their willingness to pay).

- Estimating the cost-effectiveness of different ways of improving access to NBD/NUC, for example:
 - Assisting subscriber libraries in giving end-users hands-on access to NBD/NUC.
 - Freeing access to NBD/NUC over the Web.
 - Making NBD/NUC available to end-users via the Web with (reduced) subscription charges.
- Researching the market for new and improved digital products using the Stated Choice survey method of evaluation and conducting a corresponding market demand analysis.
- Tracking usage of NBD/NUC through a system of registering users, as described in *National Library of New Zealand Market Research Project Phase 1: Current Knowledge and Research Gaps* (McDermott Miller June 2002). One objective would to measure the size of the NBD/NUC's user base and the frequency of searching by type of search with more precision than has been possible in the present project.
- Investigating how end-users perceive the Te Puna "brand" to clarify whether it:
 - supports the identity of the National Library's electronic (and other) bibliographic sources and serve as an assurance of quality to users.
 - or is a source of confusion, disguising the nature of the bibliographic search products offered by the National Library?
- Assessing international user demand and willingness to pay for NBD/NUC and other electronic services provided by National Library.