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IMPROVING THE VALUE OF TRANSPORT RESEARCH USING ADVANCED WEB TOOLS
TO IMPROVE RESEARCH DISSEMINATION

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ABSTRACT

This paper aims to measure the impact of a thematic digital research repository on spreading new knowledge research into the professional transport community using user survey findings for the SORT (Social Research in Transport) Clearinghouse (www.sortclearinghouse.info) website and a review of previous research.

Research dissemination, the circulation of research findings, has been identified as the easiest way to distribute new knowledge and thematic research clearinghouses such as SORT have been seen as a means to 'reinvigorate professional values' by providing quick access to quality research whilst also maintaining copyright protections to authors and publishers. SORT was developed out of the concern that social research findings in transport were not reaching the wider non-academic professional community. Some 1,777 separate users from 69 countries accessed the site on 3,282 visits in the first 11 months of 2009 for an average visit length of 5 minutes.

The user survey of SORT identified that policy/practitioners and consultants were the primary users of the web site (66%) with academics (27%). Most site users apply the research content accessed from SORT for 'conceptual' applications (i.e. to keep informed). A very high share of users cite research evidence in their own published work (27% of academics) supporting previous research suggesting that research clearinghouses add much value to authors, journal editors and publishers. 'Instrumental' use of research (to implement a transport plan, policy or service) represented a minority of uses (20% on average) nevertheless this is considered quite a reasonable outcome from a targeted dissemination approach. Some 40% of policy/practitioners used the research from SORT for 'instrumental' purposes and this group represents half of the user base suggesting a strong real world application of the research content in SORT. Support for this conclusion is provided from user ratings of the importance of SORT to user occupational activities. Overall 56% of all users (65% of professional/practitioners) considered SORT essential/very essential to their work.

Overall the findings provide some strong support for the view that thematic research clearinghouses might have an important role to play in bridging the gap between quality academic research published in research journals and professional practitioners planning and operating transport systems.

1 INTRODUCTION

The assessment of research has long been associated with the measurement of its wider impacts on society. Much investigation has been devoted to studying how best to inform policy with research, especially in the fields of public health, criminal justice, education and social care (Nutley et al., 2003). Yet there are still many barriers to disseminating research findings, primarily through lack of time, resources or knowledge of how best to spread research outside of academia (Hinchcliff et al., 2008).

Research dissemination – the circulation of research findings – is the simplest method to distribute new knowledge (Walter et al., 2005). Digital repositories as a means of research dissemination has grown in popularity in recent years as they are recognised as a way to spread knowledge to anyone with an internet connection (Huwe, 2008). But how effective are these tools in reaching industry professionals? Are these just a means for academics to better circulate knowledge amongst themselves or are they a way to spread new knowledge to a wider audience? Is the research used for practical outcomes or is it a means of informing a wider world of theoretical concepts?

The 'Social Research in Transport (SORT) Clearinghouse' website was developed out of the concern that research findings in transport were not reaching the wider non-academic professional community. It was established in 2007 by the Institute of Transport Studies at Monash University, Australia. It is a digital repository of worldwide, specialist research on social issues in transport and is available to anyone with internet access. As the website entered its second year, a survey of website users was conducted to understand how people were using the repository and what benefits the website might have brought to them. This website and the user survey are the focus of this paper.

This paper aims to measure the impact of a digital research repository on spreading new knowledge research into the professional community. It focuses on the SORT Clearinghouse website and assesses the impact of the system in disseminating research findings in transport using a survey of users.

The paper starts with a short review of relevant research literature on knowledge dissemination between academic and non-academic communities. This is followed by a description of the SORT Clearinghouse website and the survey of website users. The results of the user survey are then presented. The paper concludes with a summary and discussion of the key findings including the implications of the findings for future research in this field.

2 LITERATURE REVIEW

The spread of research outside of academia has been called many things, including knowledge exchange, knowledge transfer, knowledge interaction, diffusion of innovations, evidence-based policy, action research and research utilisation (Nutley et al., 2002, Scottish Funding Council, 2007, Davies et al., 2008). Success in academia requires the ability to share research within the academic community. But the role of researcher-as-advocate is limited by a lack of time, resources, or knowledge of how to spread findings outside of academia (Hinchcliff et al., 2008).

Understanding how research can better impact wider society is itself the focus of academic research. There are many ways to distribute knowledge outside of academia as shown in Table 1. The simplest form of knowledge exchange is dissemination, the circulation of research findings to potential users. This method usually requires fewer resources than the more time and labour-intensive alternatives (interaction, social influence, facilitation and reinforcement).

Tailored dissemination efforts can promote the "conceptual" use of new research, that is, it can increase awareness and understanding of research. To a lesser extent it can also encourage "instrumental" use of research, that is, putting research into action (Walter et al., 2005). The latter has been seen to be a more constructive use of knowledge i.e. to solve community problems. Knowledge

dissemination is likely to be particularly useful at strengthening evidence-based policy, a goal that is particularly gaining traction in the UK (Nutley et al., 2003).

Table 1: Methods of Knowledge Distribution

Method	Characteristics
Dissemination	Simple circulation or presentation of research findings to potential users, in diverse and more or less tailored formats
Interaction	Developing stronger links and collaborations between the research and policy or practice communities
Social influence	Relying on influential others, such as experts and peers, to inform individuals about research and to persuade them of its value
Facilitation	Enabling the use of research, through technical, financial, organisational and emotional support
Reinforcement	Using rewards and other forms of control to reinforce appropriate behaviour

From (Walter et al., 2005)

The struggle to disseminate knowledge from academics to the greater community has been identified in nearly every field where there are both researchers and practitioners (Rogers, 1995, Rynes et al., 2001, Walter et al., 2005, Hinchcliff et al., 2008). Healthcare, education, social care and criminal justice have led the way in research dissemination (Walter et al., 2005) although other fields are now trying to catch up. In transport, the field of road safety has been identified as a lead area in the move toward disseminating transport research findings (Hinchcliff et al., 2008).

The use of the web to disseminate research is now commonplace with most quality research journals providing access usually through copyright (and payment) protected portals to a wider audience than paper based publications. Free online publication of academic papers is becoming increasingly common as it is known to increase citations of research. One study of some 120,000 conference articles in computer science found that those freely available online had 157% more citations than those that were not (Lawrence, 2001).

Research publication faces a trade-off between the guarantee of research quality versus cost and ease of access. A peer reviewed quality research journal can provide high research quality but this quality usually comes at the cost of payment for access; these costs can be a barrier to non-academic professionals. A free online publication has zero cost to users and easy access but less guarantee of quality. A compromise has been the recent development of free online peer reviewed journals.

Digital repositories traditionally evolved from digital libraries out of the desire for academic institutions to communicate research content to students and the academic community. More and more universities worldwide are providing open access to research on their own websites as long as publisher copyright requirements permit (Van Noorden, 2009). This is largely based on the improved visibility of research institutions who publish on the web but is also related to the need to increase citations measured via formal research impact systems. 'The UK and Australia, which both allocate funding depending on the quality of published research, lead the world in open-access repository policies' (Swan, A quoted in Van Noorden, 2009).

Since their earliest days, digital repositories have grown beyond institution-based systems to discipline-based systems and then into cross disciplinary 'thematic' digital repositories (Peters, 2002). 'Thematic' repositories select a particular field of research or professional concern and collate research records in this field to make them easier to access for a wider professional audience. A repository of this kind has been identified as a potentially powerful tool to help disseminate knowledge since it "reinvigorates the best in our long-term professional values and makes them understandable for contemporary society" (Huwe, 2008).

A number of thematic digital repositories have been developed in transportation. Table 2 presents a summary of some of those associated with transport research including an outline of their key features.

Table 2: Example Thematic Digital Research Based Repositories in Transport

Name/ Aim	Details
Transport Research Knowledge Centre http://www.transport-research.info/web/	
Provides an overview of transport research activities at European and national level.	• EU project includes a compendium of research programs and research reports plus some thematic analysis reports of various fields. • Includes a subscriber newsletter on research updates and thematic summaries.
Transportation Research Information Services (TRIS) http://ntlsearch.bts.gov/tris/index.do	
Aims to make it easier to access government research related to transport in the US.	• A bibliographic database which works in effect as a clearinghouse in transport research • Operated by the US National Transportation Library.
National TDM and Telework Clearinghouse http://www.nctr.usf.edu/clearinghouse/	
Aims to improve the delivery of transportation demand management (TDM) and telework programs	• Run by the National Center for Transit Research (NCTR) located at the University of South Florida and supported by a range of partners • Covers a wider range of services than research reports; includes access to training courses and wider professional information. Also includes a 'listserv'; an email list of TDM professions who exchange questions on key topics.
The PEP Clearing House http://www.thepep.org/CHWebSite/	
A portal for user-friendly access to policy, legal and scientific information, as well as good practices, on Transport, Health and the Environment in the pan-European region.	• THE PEP Clearing House was established within the Transport, Health and Environment Pan-European Programme (THE PEP) • Includes a wider coverage than research including policy documents, legislation, research and methods, case studies, indicators and data, capacity building and funding opportunities
Bus Rapid Transit Clearinghouse http://path.berkeley.edu/informationclearinghouse	
Aims to provide a single online address for information related to BRT to support transit industry professionals in the planning for and implementation of systems	• A project of the California Partners for Advanced Transit and Highways (PATH) Program, at the University of California, Berkeley), and partners • Includes a BRT planning tool, links to BRT planning resources and the publication repository • 208 publication records not updated since 2006
Clearing House for Transport Data (Germany) http://www.dlr.de/vf/en/desktopdefault.aspx/tabid-2752/4269_read-2818/	
Provides a central data point for organizations who gather transport-relevant data and those who wish to use the results of such research.	• Run by the Institute of Transport Research at the German Aerospace Center • Includes access to passenger transport data and aerospace data • Involves data sharing as well as research outcomes
Transportation and Climate Change Clearinghouse (TCCC) http://climate.dot.gov/index.html	
Designed as a one-stop source of information on transportation and climate change issues.	• The U.S. Department of Transportation's Research and Innovative Technology Administration maintains the Clearinghouse • Includes published materials but mainly news reports. Includes DoT policies and upcoming events
Transportation Finance Information Clearinghouse http://transweb.sjsu.edu/MTIportal/finance/FinanceInformationClearinghouse.html	
Helps researchers, policymakers, and the public to find information on specific transportation finance topics.	• Run by the Mineta Transportation Institute • Includes a Newsletter and listserv, links to Websites and some suggested strategies for finding transportation finance research. No direct research content is stored in the site
Rural Highway Safety Clearinghouse http://www.ruralsafety.umn.edu/clearinghouse/index.html	
Aims to be an easy-to-use starting point for information about safety on US national rural roads.	• Run by the Center for Excellence in Rural Safety (CERS) at the University of Minnesota, is supported by the US Federal Highway Administration (FHWA). • Provides links to safety publications and other resources (education, emergency medical services, enforcement, and engineering topics) plus data and statistics, driver behaviour, safety planning, seat belts, and work-zone safety.
Travel Model Improvement Program Clearinghouse http://tmip.fhwa.dot.gov/resources/clearinghouse	
Aims to advance the state of the practice of travel modelling and planning analysis.	• Run by the US department of Transportation • Access to over 200 research documents on the subject • Links to professional development sites provided.
Clearinghouse of Transit Agency Sustainable Practices http://www.fta.dot.gov/planning/planning_environment_8524.html	
No aims stated but provides examples of practices in this area	• Run by the US Federal Transit Agency links to a few example projects and 2-3 reports on related issues.

There is a wide variation in the degree to which peer reviewed research is incorporated into these clearinghouses. Some have a national or even an international focus whilst others focus on specialist research fields in specific geographical areas.

Although the benefits of free-access research have been discussed, the benefits of individual websites to knowledge dissemination have rarely been measured. Download rates are often used to indicate the success of a website but it is not known who downloads papers and how (if at all) the research is used.

It is with these questions in mind that this paper describes the SORT Clearinghouse website, its users, and a survey of their experience using the repository.

3   THE SORT CLEARINGHOUSE WEBSITE

The SORT Clearinghouse website was established in July 2007 by the Institute of Transport Studies (ITS) at Monash University, Australia on behalf of the Victorian Department of Infrastructure (now Department of Transport). It was developed as part of a wider research program involving social issues associated with passenger transport and focused on new research project 'Investigating Transport Disadvantage, Social Exclusion and Well-being in Metropolitan, Regional and Rural Victoria'[1]. This project spurred a range of activities promoting consideration of social issues associated with transport planning including the research clearinghouse (described in detail in Lucas and Currie, Under Review).

The website's major feature is a collection of research works on the topic of social research in transport. These works are categorised by author, title and subject areas. The types of work include journal articles, unpublished papers, conference presentations, book sections, websites and theses. At its inception the repository hosted 100 documents; this has increased by about 15 documents per month to around 400 documents at the time of the user survey (December 2008)[2]. The majority of documents are sourced by the website manager who also manages the copyright permission process. Where possible, documents are hosted on the repository server and made freely available. Where publishers wish to protect copyright a link to the research or an abstract is provided.

The website also includes links to related resources, an author-submission system and a bi-monthly newsletter focussing on new research publications in the field. Authors are encouraged to submit research directly to the website manager however submission rates have been low. The website manager compiles the newsletter which contains a list of the most recent additions to the website as well as any relevant news. The subscription base of the newsletter is currently 168 (Dec 2009[3]).

Usage of websites depends on the focus of the site, the scale of its geographical coverage as well as the appeal of the site itself to users. SORT has a modest user base due to its relatively small specialist field. In the first 11 months of 2009 some 3,282 site visits were made with an average time on site of 5 minutes. After accounting for multiple visits the number of people using the site during this period was 1,777. Visitors are a mix of local and international. There were visitors from 69 countries during this period with Australian visitors representing 62% of all visits. The US and Europe together accounted for a quarter of all visitors in broadly equal amounts. The remaining 13% were from a diverse range of countries with Canada, New Zealand and Brazil leading this wider geographic group. Within Australia, the State of Victoria (where SORT originated) accounts for 45% of all site usage while interstate Australian visitors represent 18% of total visitation.

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[1] In association with the University of Westminster (UK), University of Ulster (UK), Department of Infrastructure, Victoria, the Bus Association of Victoria and the Brotherhood of St. Laurence. The principal chief investigator is Prof. G. Currie, the chief investigators are Prof. T. Richardson, Prof. P. Smyth and Dr. D. Vella-Brodrick. The partner investigators are Prof. J. Hine, Dr. K. Lucas, Mr. J. Stanley, Dr. J. Morris, Mr. R. Kinnear and Dr. J. Stanley. The study Research Fellow is Ms Alexa Delbosc.
[2] There were 568 papers held in May 2010
[3] There were 187 newsletter subscribers in May 2010.

4   SURVEY METHOD

In late 2008 a survey was designed to understand the benefits of the SORT website, identify areas for improvement and identify characteristics of the users of the SORT Clearinghouse website. The key survey goals relevant to this paper concern the investigation of how the system is being used and how users value the clearinghouse as a tool for conducting their work.

The questionnaire was designed and uploaded onto the online hosting system "Surveymonkey" and piloted using a group of researchers. A finalised questionnaire was modified using suggestions from the pilot. SORT website users were invited to complete the survey via the email newsletter. In order to capture website users who do not receive the email newsletter, a link to the survey was added to the home page of the SORT Clearinghouse website. The survey was available from the 10th of December 2008 to the 5th of May 2009.

5   SURVEY FINDINGS

In total the survey response was modest; a total of 50 respondents completed the questionnaire. Because of the small sample caution is warranted in the assessment of results. To test for sample bias the response rate was cross checked against user location and frequency of usage. These were broadly in line with known user characteristics from the web monitoring system with a slight bias to Australian survey respondents (73% of survey respondents were from Australia while site user data suggests Australia represents 62% of visits).

The following result areas are now examined:
- Site user and usage characteristics
- Use of site data by user occupation group.

5.1   Site User and Usage Characteristics

Table 3 shows the key user characteristics from the survey.

Table 2: Website User Characteristics

Occupation	Share of Sample (%)
Government policy provider	34
Academic or researcher	27
Consultant	17
Social / health service provider	10
Transport service provider	5
Student	0
Other	7

The single largest occupation grouping was 'government policy provider' at 34%. Along with other providers and consultants, at least 66% of the sample was an industry practitioner of some kind. 'academic or researcher' made up only 27% of the survey sample. To enable a closer examination of usage characteristics by occupation group these groups were aggregated into four sub-groups: 'academics' (27%), 'consultants' (17%), and the remaining occupations (excluding 'other') into a group called 'policy/practitioners' (49%).

Table 4 shows the frequency of usage of the site by user group. Overall just over half site usage is at least monthly. Academics tend to use the site less frequently (most use it every few months) whilst the most frequency users are policy/practitioners with 63% using the system at least monthly. Consultants lie somewhere between the academics and policy/practitioners in terms of frequency of usage. Some 12% of those completing the survey had used the site for the first time.

Table 3 : Website Use Frequency by User Group (% Total by Group)

% Total Frequency of Site Usage	Occupation Group			
	Academics	Consultants	Policy/ Practitioners	Total
more than once a week	9	14	0	7
at least monthly	18	29	63	44
every few months or less	64	29	25	37
first visit	9	29	13	12
Total	100	100	100	100

5.2 Use of Site Data by User Occupation

Survey respondents were asked to select from a list the ways they had used documents from the SORT website. Table 4 shows the range of responses which have been classified into two groups; conceptual use of data (i.e. to inform) and instrumental use of data (i.e. to adopt a concept into a new transport service or plan). These groupings are based on the theoretical structure of knowledge application (Walter et al., 2005).

Table 4 : Use of Website Data by User Group (% Total by Group)

% Total Use of Website Data[1]	Occupation Group			
	Academics	Consultants	Policy/ Practitioners	Total
Conceptual Use of Data				
Read document to keep myself informed	64	100	90	81
Cited as a reference in an academic report or book	27	29	25	24
Cited a document for teaching materials	0	14	0	17
Cited as reference in coursework	0	14	5	2
Total conceptual use[2]	**64**	**100**	**90**	**81**
Instrumental Use of Data				
Used document to develop transport policy or plan	0	0	35	17
Used document to implement transport service	0	0	10	5
Total instrumental use[2]	**0**	**0**	**40**	**20**
Haven't used any documents	36	0	5	12

[1]Multiple choice permitted. [2]Note that totals discount for people who used data in more than one way

Overall the response suggests that most information from SORT is used conceptually, to keep people informed. This is consistent with the work of Walter et al. (2005) who found that dissemination approaches were likely to result in conceptual use of research. A further 24% of users said they cited SORT content in their own work. This strong response matches previous research showing that authors including content on free to access repositories such as SORT increase citations (Lawrence, 2001).

Instrumental use of data represents a minority of users although at 20% this is still quite a reasonable proportion for a targeted dissemination approach. Perhaps not surprisingly it is the policy/practitioners who make instrumental use of data whilst all other groups are restricted to conceptual uses. However with 40% of the policy/practitioner groups using SORT content for instrumental purposes, and this group representing almost half the sample, it is clear that the site is having a strong real world application of content.

Table 5 shows the response of each of the user groups to a question asking how SORT acted to assist their work.

Table 5 : How SORT Assists Work by User Group (% Total by Group)

% Total How SORT Assists Work[1]	Occupation Group			
	Academics	Consultants	Policy/ Practitioners	Total
Conceptual assistance				
Lets me access research I wasn't aware of	73	57	85	78
Keeps me informed / up to date	64	86	65	68
Lets me access research not available elsewhere	27	29	35	34
Total conceptual assistance[2]	82	100	100	95
Instrumental assistance				
Helps me develop better transport policies	9	14	30	20
Helps me plan better transport services	0	0	15	7
Total instrumental assistance[2]	9	14	35	22
None of these	9	0	0	2

[1]Multiple choice permitted. [2]Note that totals discount for people who selected more than one option

Again the use of SORT content for conceptual assistance dominated however in this case Academics and Consultants as well as the larger Policy/Practitioner group suggested SORT provided instrumental assistance. Academics and Consultants suggested SORT assisted in developing better policy rather than operations. The most common individual assistance provided by the site was in making policy/practitioners aware of new research topics. Consultants and Academics believed the site kept them up to date with current developments in research in this field.

Respondents were also asked how important SORT was to the work they did (Table 6).

Table 3: Importance of SORT website to Occupation

% Total Importance of SORT to Occupation	Occupation Group			
	Academics	Consultants	Policy/ Practitioners	Total
Extremely Essential	9	14	15	12
Essential	27	43	50	44
Neither	55	43	35	42
Irrelevant	9	0	0	2
Extremely Irrelevant	0	0	0	0
TOTAL	100	100	100	100

Some 56% thought the site was essential/ extremely essential (65% for Policy/Practitioners). Some 12% of all respondents considered the system extremely essential. Overall a majority of all user groups find the site important to their work although the Policy/Practitioners and Consultants have a higher rating. Only 2% considered the site irrelevant and none found it extremely irrelevant.

6   SUMMARY AND DISCUSSION

This paper aims to measure the impact of a digital research repository on spreading new knowledge research into the professional community using user survey findings for the SORT Clearinghouse website and a review of previous research. A particular aim of the paper is to understand to what extent research content accessed via SORT is being used for 'conceptual' (increasing general awareness) vs 'instrumental' (putting research into action) applications in the professional and academic community.

The literature suggests that a major requirement of transport research is its application for practical uses with the professional transport community. Research dissemination, the circulation of research findings, has been identified as the easiest way to distribute new knowledge (Walter et al., 2005) and thematic research clearinghouses such as SORT have been seen as a means to 'reinvigorate professional values' by providing quick access to research (Huwe, 2008). However there is no research base to assess how effective these systems are in distributing research. It is not clear who uses research repositories and how users apply the knowledge accessed via these clearinghouses.

The 'Social Research in Transport (SORT) Clearinghouse' website was developed in 2007 out of the concern that research findings in transport were not reaching the wider non-academic professional community. Some 1,777 separate users accessed the site from 69 countries on 3,282 visits in the first 11 months of 2009 for an average visit length of 5 minutes.

The user survey of SORT identified that policy/practitioners and consultants were the primary users of the web site (66%, academics, 27%) suggesting that SORT is reaching its target group of industry practitioners. Frequency of site visitation (more than monthly) was highest for the professional/practitioner occupations more than the academic groups. Most site users apply the research content accessed from SORT for 'conceptual' applications (i.e. to keep informed). A respectable share of users cites research evidence in their own published work (27% of academics). 'Instrumental' use of research (to implement a transport plan, policy or service) represented a minority of uses (20% on average) nevertheless this is considered quite a reasonable outcome from a targeted dissemination approach. Some 40% of policy/practitioners used the research from SORT for 'instrumental' purposes and this group represents half of the user base suggesting a strong real world application of the research content in SORT. Support for this conclusion is provided from user ratings of the importance of SORT (and the access it provides to quality research) to user occupational activities. Overall 56% of all users (65% of professional/practitioners) considered SORT essential/very essential to their work.

These findings suggest that thematic research clearinghouses have an important role to play in bridging the gap between quality academic research published in research journals and professional practitioners planning and operating transport systems. Quality research journals using peer review processes ensure research quality but have poor penetration into the professional community. Free-to-access web sites have good accessibility but unclear research quality. The results of this study suggest that thematic clearinghouses appear to provide an acceptable means of access which bridges important publishing copyright considerations as well as providing credible quality research content.

The research also confirms the value of free-to-access websites as a means of increasing author citations to their research papers. Previous research has shown a clear link between free-to-access papers posted on the web and their citation rates (Lawrence, 2001). This research suggests that a thematic clearinghouse can increase citations of quality academic content (from research journals) by making it easier to find that content via the clearinghouse. This should considerably increase the value of having research included on a clearinghouse for authors, journal editors and publishers. In effect the site acts as another means of accessing research publications which is attractive to the professions but also protects copyright.

This finding is particularly interesting since the experience of this paper's authors in dealing with journal publishers has been highly variable. At least one major publishing group has required payment in order to link to abstracts in the SORT database despite the clear finding from this research that linking to published research is of benefit to publishers and authors alike. Most publishers however have understood this link and readily agree to include of their work on the site as long as copyright restrictions are followed.

A major outcome of the paper is the strong 'instrumental' use of the research content included in SORT. 'Conceptual' applications were more common and to some extent expected however the high share of policy/practitioner groups using research for real world plans, policies and services is very

encouraging. This finding raises questions regarding the relative effectiveness of a thematic repository compared to research dissemination through existing quality journals. A number of areas for new research regarding these issues are suggested:

- It would be of value to compare the relative effectiveness of alternative methods of research dissemination in reaching the professional community in both conceptual and instrumental applications of research.
- Industry practitioners use a range of sources to keep abreast of new knowledge. It would be useful to understand the importance of thematic clearinghouse websites relative to these other sources.
- While a strong link to instrumental use of research content has been established it is not clear what depth of real world applications are occurring. How often does an application of research result on a new service, policy or plan? What scale of actionable results emerged and to what extent was the research involved responsible for these outcomes? Which research acts to provide the best value for practitioners?
- Research could investigate the barriers to effective dissemination and use of data amongst the professional community, particularly the barrier of subscription-based journal articles. It is unknown from the current study whether SORT users were able to access copyright-protected journal articles or whether they had to restrict their use to articles that were completely free-to-access.
- Following on from the above it would be of value to establish what factors make a thematic clearinghouse more or less effective in bringing down these barriers.

Overall the paper provides some strong justification for the development of thematic clearinghouses in transport to act as a means by which practical outcomes in transport can be influenced by quality research.

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