OPPORTUNITIES AND CONSTRAINTS IDENTIFIED IN EXISTING FRAMEWORKS IN USE FOR ORGANISATIONAL LEARNING

Christine Owen
University of Tasmania, Bushfire and Natural Hazards CRC

Version	Release history	Date
1.0	Initial release of document	30/12/2018

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EXECUTIVE SUMMARY

This deliverable is adapted from the Owen, Bethune & Krusel (2018) Report on Research Utilisation Review. This review was a collaboration between AFAC, the BNHCRC and the Decision tools project – organisational learning stream. The review included previous data collection about use of BNHCRC tools (e.g., websites, hazard notes) as well as the opportunity to collect data nationally to inform the Decision Making tools organisational learning stream. That included the work further developing and validating a research utilisation matrix and to identify opportunities and constraints in agencies for organisational learning.

The analysis reported here continues to be further advanced in discussions with the Knowledge Innovation and Research Utilisation Network (KIRUN) where the findings were presented in August 2018. Based on that consultation work continues to be advanced to establish the next deliverable:

Framework synthesising existing agency practice in assessing and evaluating evidence that may require organisational learning and change". The further development will also facilitate the development of papers for publication.

INTRODUCTION

In emergency management organisations, the drive for organisations to learn from research to inform practice has been growing for some time. The paper advances on findings from a longitudinal survey that explored, in part, perceived effectiveness in research utilisation to inform organisational learning[1]. This paper advances analysis from the survey findings to explore the opportunities and constraints identified for use in organisational learning.

Research utilisation is critical not just for organisational growth, competitiveness and sustainability (Standing et al. 2016) but also for wide-scale sector development, community and economic wellbeing (Cutler 2008, Ratten, Ferreira & Fernandes 2017). In many countries collaboration and innovation are supported by government policies and initiatives that fund cooperative research centres to take a collaborative approach to research and development. These research centres produce ideas and outputs that can be adopted by organisations and used. However, research examining how research outcomes lead to learning, including enablers and constraints, appears limited to the medical field in general (Elliott & Popay 2000, Kothari, Birch & Charles 2005) and nursing in particular (Brown et al. 2010, Carrion, Woods & Norman 2004, Retsas 2000).

This paper considers this gap for the emergency services sector and investigates the approaches to using research outputs to inform work practice and support organisational learning. The emergency services sector gains insights from research undertaken through a range of sources such as direct commission and academic institutions, as well as through bodies such as the Australasian Fire and Emergency Services Authority (AFAC) and the Bushfire and Natural Hazards Cooperative Research Centre (CRC).

Emergency services organisations currently grapple with complex and 'wicked' problems (Bosomworth, Owen & Curnin 2017). When engaging with cooperative research centres agencies typically ensure that the research being undertaken is aligned to their needs. Over the past decade there has been increasing scrutiny on these organisations to justify actions (e.g. Eburn & Dovers 2015, Boin & t'Hart 2010). There is an urgent need for these learning organisations to develop their evidence informed practice.

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[1]The full report on research utilisation can be found at https://www.afac.com.au/docs/default-source/ru/report-on-research-utilisation-review-2018.pdf

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LITERATURE REVIEW

The value of organisations learning from research is well established (e.g. Brown & Frame 2016, Cutler 2008; Dearing 2009, Janssen 2003). When research utilisation is done well it enables:

•   the pace of adoption processes to be accelerated (Helmsley-Brown 2004, Marcati, Guido & Peluso 2008)

•   the number of adoptions possible from conducted research to be increased (Dearing 2009, Retsas 2000)

•   the quality of research implementation to be enhanced (Janssen 2003, Kothari, Birch & Charles 2005)

•   the use of worthy innovations (Glasgow, Lichenstein & Marcus 2003, Standing et al. 2016)

•   the research effectiveness at agency and sector levels to be demonstrated (Elliott & Popay 2000).

Research is only one of several ingredients for successful learning and innovation and, in many respects, only the start of the process. Utilisation from research does not magically follow from research outputs. What is needed is a systematic learning process to follow through from research insights to consider the implications and to develop processes that support review and, where needed, implementation and change.

Studies of utilisation and the barriers that need to be overcome (e.g. Funk et al. 1991, Cummings et al. 2007, Brown et al. 2010) suggest that research is used through a process by which new information or new ideas are communicated through certain channels, over time and among members of a social system. The process includes:

•   disseminating new ideas or findings among members of a social system (Hemsley-Brown 2004, Brown & Frame 2016)

•   assessing and evaluating the ideas in terms of their relevance to members of the social system (Carrion, Woods & Norman 2004, Dearing 2009)

•   implementing changes that may be needed (Brown et al. 2010, Elliott & Popay 2000)

•   monitoring the effects of the changes put in place (Cummings et al. 2007, Cutler 2008)

•   reporting outcomes of changes made as a result of the new idea (Glasgow, Lichtenstein & Marcus 2003, Standing et al. 2016).

This brief review shows that a better understanding of the processes to learn from and utilise research is important, especially if emergency services organisations are to maximise investment and engagement with cooperative research centres. Research utilisation occurs through social interaction and the development of shared understanding as well as organisational processes to embed new ideas into work practice.

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RESEARCH APPROACH

The methods used to collect the data are fully described in Owen, Krusel & Bethune (2018). In summary, the structure of items in the survey were initially developed from the review of the literature where the key activities known to be important were identified and sequenced. The survey was distributed in February 2018 to 47 agencies. Agency contacts were requested to distribute the survey to 5-15 people, using the following stratified sample:'

- Senior management: the most senior person in the organisation responsible for the following areas:
  - communications
  - training and development
  - operations
  - community safety
  - knowledge management/innovation/research;
- Five persons at middle-management including regional operational and non-operational personnel (e.g. District Managers);
- Five persons in operational or front-line service positions (e.g. volunteers, field operations personnel, community education officers, training instructors).

The purpose of this sampling method was to target personnel who could reasonably be expected to:

- have an understanding of the strategic planning of the agency;
- have some awareness and/or involvement in CRC activities; and
- include those persons responsible for implementing any changes needed based on research evidence.

In the 2018 sample, 190 responses were received from 29 agencies. The participation rate of 63% is good for online surveys of this type (Barach & Holtom, 2008).

SAMPLE

The median number of years that survey participants have been in the industry was 19, and the median number of years within the agency was 12, thus demonstrating the level of experience of those responding. Of the participants who answered the question about their position in the agency, 11 (6%) were in senior management positions (e.g., Directors); 70 (37%) were in middle management roles (e.g., District Managers) and 41 (22%) had front line responsibilities (e.g., training instructors). 68 (36%) respondents did not answer the question.

There was also a reasonable spread of participation from the kinds of agencies included in the sector with the exception of urban agencies where only two agencies participated yielding 15 (8%) of responses. Most of the responses came

from people participating in agencies that have multiple hazard roles (n= 55 or 29%) indicating the structural shifts occurring within the industry as well as a broadening of the CRC industry stakeholder base. Participation from rural agencies was also well represented (n= 46 or 24%). Land management agencies (n=37 or 20%); State Emergency Services (n = 23 or 12% and agencies with another role (e.g., critical infrastructure, humanitarian, specialist science roles; n= 14 or 7%) comprised the balance.
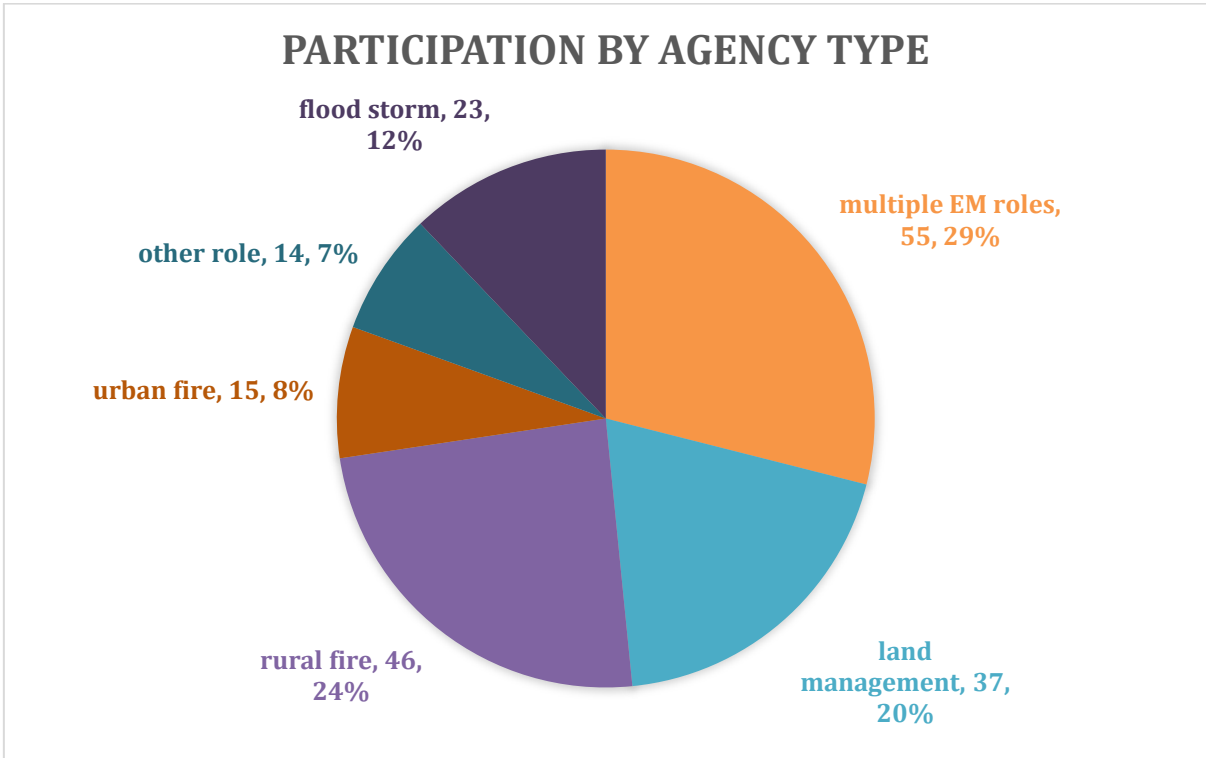

FIGURE 1: SURVEY PARTICIPATION BY AGENCY TYPE

The report by Owen et al (2018) outlines the descriptive details based on all the questions. This deliverable will just focus on the findings that relate to the perceived opportunities and constraints for organisational learning in the sector.

FINDINGS

This section will briefly outline the perceptions about organisational learning and learning in the sector more generally as well as perceived opportunities and constraints to utilising new products to support learning. Finally the subsequent analysis of survey items based on the research utilisation maturity matrix will be advanced.

PERCEPTIONS OF ORGANISATIONAL LEARNING

The 2018 survey again sought perceptions of the degree to which (i) the agency and (ii) the fire and emergency services industry could be characterised as having an emphasis on learning, where a learning organisation/industry was defined as one that learns from the experience of its own members or the experience of others. These were questions that had been sought each year since the first survey in 2010. In the 2010 survey participants were also asked to report on where they thought the industry was five years previously. As can be seen from Figure 2, perceptions of learning in agencies, as well as in the industry, following a bump in 2014, remains static.

On the one hand, it might be reasonable to conclude that a self-assessed report card equivalent of 62% (4.34/7) might be as good as can be expected for agencies. On the other hand, it might also suggest that existing strategies are not assisting agencies to get the most out of their research investment. Given the increased exposure of agencies to public scrutiny, not being able to point to a strong evidence-informed learning culture would seem to be a vulnerability with associated risk.

Perceptions of agency/industry as one based on learning

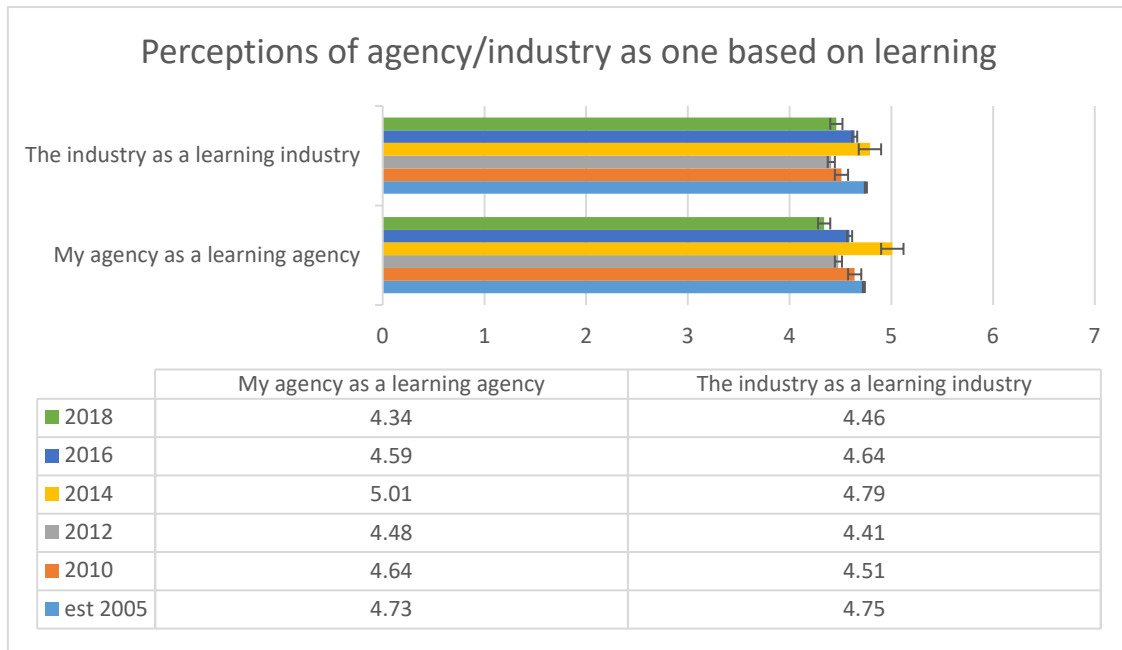|	My agency as a learning agency	The industry as a learning industry
2018	4.34	4.46
2016	4.59	4.64
2014	5.01	4.79
2012	4.48	4.41
2010	4.64	4.51
est 2005	4.73	4.75

FIGURE 2: MEAN OF RESPONDENT'S PERCEPTION OF LEARNING IN THEIR AGENCIES AND THE INDUSTRY OVER TIME. PERCEPTIONS RATED FROM 1 TO 7 IN SURVEY.[1]

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[1] *2005 – AS ESTIMATED BY PARTICIPANTS IN 2010 AND WHO HAD BEEN IN THE AGENCY/INDUSTRY AT THAT TIME TO RECALL.

Following the 2016 survey findings the importance of organisational learning to support adaptation, innovation and change within the industry were discussed with the projects end-users.

It was agreed that indicators of a learning culture (or its absence) should be trialled in the 2018 iteration. 16 items were included, based on the work of Lisa Jackson at Emergency Management Victoria (EMV). The items included 8 positive and 8 negative statements about the culture of the respondent's agency. An exploratory principal components factor analysis[i] was conducted on the responses in the 2018 survey to these items to ascertain if there were any underlying dimensions that could be identified. The analysis was conducted with items sorted to reflect the relative strength of loadings per factor. Four components were identified and in combination explained 61% of the variance in response patterns, well above the standard of 50% (Field, 2009) – see Table 1.

This work is in its early stages and in time will be reported following consultation with the KIRUN AFAC group and Lisa Jackson (EMV) later in 2018. The Table below suggests aspects that those interested in facilitating a learning culture may need to assess, promote or mitigate in the case of the items indicating the absence of a learning culture.

TABLE 1: FACTOR ANALYSIS OF INDICATORS OF A LEARNING CULTURE, 2018

	Sharing climate	Negative outcomes	Dysfunctional aspects	Individual motivation
Openness is valued in the organisation	0.802			
Leaders are aware of their own biases and encourage others to be also	0.779			
Differences in opinion are welcome	0.729			
Most people are eager to share information about what does and does not work	0.566			
We are good at learning from experience	0.497			
lessons to be learned tend to fall into a black hole		0.797		
Lessons don't get learned		0.72		
We tend to reinvent the wheel		0.561		
Lesson-learning is seen as a witch-hunt and/or blame game		0.551		
Most people here think we are the best at what we do and don't need to improve			0.755	
Telling the truth can be viewed as 'unhelpful' or disloyal			0.745	
Leaders rarely open up about their own vulnerabilities			0.541	
I see other people's knowledge as something I can use and learn from				0.762
If I have learned something new, I see it as my duty to share it				0.683
Extraction Method: Principal Component Analysis.				
Rotation Method: Varimax with Kaiser Normalization.				
a Rotation converged in 5 iterations.				
b Only cases for which Survey year = 2018 are used in the analysis phase.				

CONSTRAINTS ON ORGANISATIONAL LEARNING

Participants were also asked to provide an assessment of the degree to which key barriers might be impeding organisational learning research utilisation. The

2010 survey included 28 items adapted from research undertaken in related domains (Baernholdt & Lang 2007; Funk, Champagne, Weise & Tornquist 1991; Retsas 2000; Hemsley-Brown & Oplatka 2005). Following a review of the items in a factor analysis, 15 items were retained and included in 2012, 2014, 2014 2016 and 2018 surveys. Given some of the challenges discussed already a review of the barriers experienced by participants might help flesh out some key concerns so that these may be addressed. An additional item was added to the 2018 survey *research outcomes are politically unpalatable*. Interestingly, this item did not feature strongly either in the top five reported below or in any of the dimensions emerging from the factor analysis.

Barriers to learning and implementation

The highest scoring barriers are presented in Table 2 in rank order, across all five data points[2]. The Table shows that there are consistent barriers identified across all three data points. The items that were included in the top five rankings in 2018 are:

- The impacts of the research for the agency need to be better articulated.

- As an agency we don't have an effective process for translating the research for our personnel.

- Most people in this agency don't know about the research.

- The agency hasn't developed the appropriate assessment strategies to consider implications of the research.

- We need a change advocate within the agency to take the implications forward.

- We need cooperation from other stakeholders in the industry for successful implementation.

The consistency of these items across the data points suggests the continuing intractable nature of some of these barriers and the need for a more concerted effort to develop capabilities and/or support resources for both researchers as well as end-users and others in agencies tasked with assessment and implementation (who are not necessarily end-users, who have a different role to play). Given the complexity of research products and the potential multiple implications it is also important to develop a nuanced approach and not expect that one approach will fit all.

TABLE 2: SUMMARY OF BARRIERS ITEMS AND RANKING FOR 2010-2018.

List of barriers statements	2010	2012	2014	2016	2018
1. Implications for practice are not made clear					
2. The reports are hard to read					
3. Most people in this agency don't know about the research	4th	3rd		1st	3rd
4. Agency personnel don't have the capacity to think strategically about what the research may mean for our business					

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[2] One item included in the 2010 survey that was second overall "*there needs to be better linkages between researchers and practitioners*" was dropped

5. There is too much change happening in this agency already, we don't need more to be considered					
6. It is not clear what change is needed					
7. We need a change advocate within the agency to take the implications forward		2nd	4th	5th	Equal 5th
8. The impacts of the research for the agency need to be better articulated	1st	1st	1st	2nd	1st
9. We need cooperation from other stakeholders in the industry for successful implementation			2nd	3rd	Equal 5th
10. The amount of research information is overwhelming					
11. Personnel don't feel capable of evaluating the quality of the research					
12. The research is hard to find					
13. It is not clear who is dealing with what Bushfire CRC research in our agency					
14. As an agency we don't have an effective process for translating the research for our personnel	3rd	5th	3rd	4th	2nd
15. The agency hasn't developed the appropriate assessment strategies to consider implications of the research	5th	3rd	5th		4th
16. Research outcomes are politically unpalatable[3]	-	-	-	-	
Total number of responses	148	94	180	207	142

Analysis of the barriers as constraints

The analysis revealed that in responding to the 14[4] barriers items, four dimensions could be identified (for details of the analysis see Attachment 1). Table 3 shows the factor loadings after rotation and where items with loading less than 4 were not included. The items that cluster together suggest that factor 1 represents barriers relating to agencies connecting research outputs to their business; factor 2 represents barriers associated with making sense of the implications and its consequences for practice and limits to change and factor 3 represents barriers to accessing and understanding the research.

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[3] New question added in 2018

[4] Two items were removed from the analysis. "the reports are hard to read" and ; "*research outcomes are politically unpalatable*" did not provide sufficient weighting (was below .4).

First factor- Structural barriers to connecting research with agency business

The first and the factor given the most weighting in the response pattern relates to the internal processes agencies have in place to assess, analyse and evaluate what the research means for their business. Items included in this factor include:

- The agency hasn't developed the appropriate assessment strategies to consider the implications of the research.

- As an agency we don't have an effective process for translating the research for our personnel.

- It is not clear who is dealing with what Bushfire CRC research in our agency.

This barrier indicates a need to address internal governance processes for increasing the effectiveness and efficiency of connecting research to agency business. This includes transforming research output into meaning for agency practice through streamlined assessment processes. This requires clarity and visibility about who is responsible for value-adding to research outputs for the agency. The CRC may be able to play a role in ensuring that the personnel engaged in various projects are communicated to a coordination point.

All 3 items were also included as the first factor in the 2016 survey, which indicates that this barrier continues to be problematic. An important opportunity in the future would be to better understand the reason why these barriers are so persistent. Insights may also be gained for the wider industry from case studies of where particular agencies are doing well in their approaches to connecting research to agency business.

Second factor- Barriers to understanding the implications and to enabling change to move forward

The second factor relates to the need to overcome barriers to understanding the implications of research for practice and arrangements to support the changes needed at an agency and industry-wide level, in the context of a range of other impacts on agencies. This suggests a need to support prioritisation of changes needed and ways to interconnect potentially disparate research outputs. Items in this factor include perceptions that:

- The impacts of the research for the agency need to be better articulated.

- We need cooperation from other stakeholders in the industry for successful implementation.

- We need a change advocate within the agency to take the research implications forward.

- The amount of research is overwhelming.

- There is too much change happening in this agency already, we don't need more to be considered.

This factor also connects to the next one which is about ensuring research is visible for access and understanding.

Third factor- Barriers to accessing the research and its meaning to understanding the implications and to enabling change to move forward (decoding)

The third factor relates to the ability and confidence of participants to make meaning of the research reports and outputs. These items include reference to:

- Implications for practice are not made clear.

- The reports are hard to read.

- Most people in this agency don't know about the research.

It may be that barriers to accessing the research and its meaning connects factors 1 and 2. It indicates a need to build capability to be able to read, assess and critically evaluate the quality of the research so that it can be trusted.

Clearly information products such as Hazard News and Hazard notes assist in distilling the main ideas emerging from the research. These and other resources from the website should continue to include some assistance aimed at interpretation of research terms and could also provide suggestions for how such research might be assessed for implications as well as articulating what the findings imply for changes to practice.

However, as has already been discussed assessing the implications of research for practice is not easy to address, as the implications will change for different agencies and even different functional units within the agency. It is thus critical to acknowledge that developing a capacity to better understand the implications for practice will require significant effort and a targeted strategic approach.

Fourth factor- Barriers to capability and capacity to address implications

The fourth factor relates to the ability and confidence of participants to evaluate the research and to find the space to think about what it means for the future. These items include reference to:

- Personnel don't feel capable of evaluating the quality of the research.

- Agency personnel don't have the capacity to think strategically about what the research may mean for our business.

- It is not clear what change is needed.

As indicated in the opportunities for collaboration, involvement in a project team and engagement in an AFAC collaboration group play a key role here. However, it is also important to question whether this engagement is targeting the key people (front line personnel) who need to be involved if they are to implement the changes needed.

The results from the potential barriers to research utilisation section are interesting in that they provide insights into the challenges facing the fire and emergency services industry. The analysis suggests that for significant leverage from utilisation to occur there is a need to build agency and industry capability in assessment and evaluation of potential impacts, as well as in processes of sense-making and assessment and evaluation.

TABLE 3: BARRIERS ITEMS GROUPED INTO FACTOR

Rotated Factor Matrix[a]				
	Factor			
	1	**2**	**3**	**4**
Q11.15. The agency hasn't developed the appropriate assessment strategies to consider the implications of the research	0.812			
Q11.14. As an agency we don't have an effective process for translating the research for our personnel	0.808			
Q11.13. It is not clear who is dealing with what Bushfire CRC research in our agency	0.776			
Q11.8. The impacts of the research for the agency need to be better articulated		0.753		
Q11.9. We need cooperation from other stakeholders in the industry for successful implementation		0.696		
Q11.7. We need a change advocate within the agency to take the research implications forward		0.643		
Q11.10. The amount of research information is overwhelming		0.551		
Q11.5. There is too much change happening in this agency already, we don't need more to be considered		0.478		
Q11.1. Implications for practice are not made clear			0.758	
Q11.2. The reports are hard to read			0.741	
Q11.3. Most people in this agency don't know about the research			0.678	
Q11.11. Personnel don't feel capable of evaluating the quality of the research				0.814
Q11.4. Agency personnel don't have the capacity to think strategically about what the research may mean for our business				0.75
Q11.6. It is not clear what change is needed				0.46

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a Rotation converged in 7 iterations.

b Only cases for which Survey year = 2018 are used in the analysis phase.

Analysis of organisational learning strategies to support utilisation

As discussed in the 2016 research utilisation report, the qualitative responses to the question "*What strategies does your agency have in place to keep up to date with research?*" were reviewed to identify patterns in the data. An analysis of the 2016 comments showed that some agencies had formalised processes in place to discuss and review research while other agencies leave this up to individual personnel.

Given the importance of the methods agencies use to keep up-to-date with research as indicators of organisational learning these comments were further

analysed. Four themes emerged that could be identified as developmental in terms of a new variable labelled research utilisation maturity. These themes were again used and applied to code the comments provided in the 2018 data by the three authors. The total number of comments coded to each level for both the 2016 and 2016 surveys is provided in Table 4 and in Figure 3.

TABLE 4: RESEARCH UTILISATION MATURITY CODES AND EXAMPLES

Level	Description	Examples in data
1 N=75; (25%)	Systems are ad hoc and unsystematic. Attempts to keep up to date with research depend on individual effort	*"Undefined, not clearly communicated within communications. Nil business unit assigned to research and development. "* *"the onus for keeping up to date is largely upon individuals maintaining an interest, or subscribing to emails".*
2 N=116; (39%)	Some systems and processes are documented which enables research to be disseminated. There is little or no evidence of analysis or impact assessment.	*"We have 2 people that email CRC updates to staff."* *"Lots of material is distributed via our portal and email to keep staff and volunteers informed."*
3 N=66; (22%)	There are standard processes in place for reviewing research (e.g., dissemination and review either through job responsibilities or an internal research committee). No evidence of how the findings are translated or connected to operational activities	*"Developed a Research Committee"* *"SME's appointed as capability custodians to ensure up to date best practice."*
4 N=42; (14%)	There is evidence of active connections between research and operational activities. Operational and strategic decisions are informed by assessing research using formal research utilisation processes. These processes and systems are widely understood and controlled	*"… a process of ensuring results are read by key specialist staff involved in programme design and delivery, are interpreted and analysed for their implications and relevance and then used to inform decision making and strategy through numerous internal for a"* *"Alignment of evidence based decision making in the planning phases of annual planning and the development of indicators around causal factors that inform emergent risk"*

Coded qualitative comments

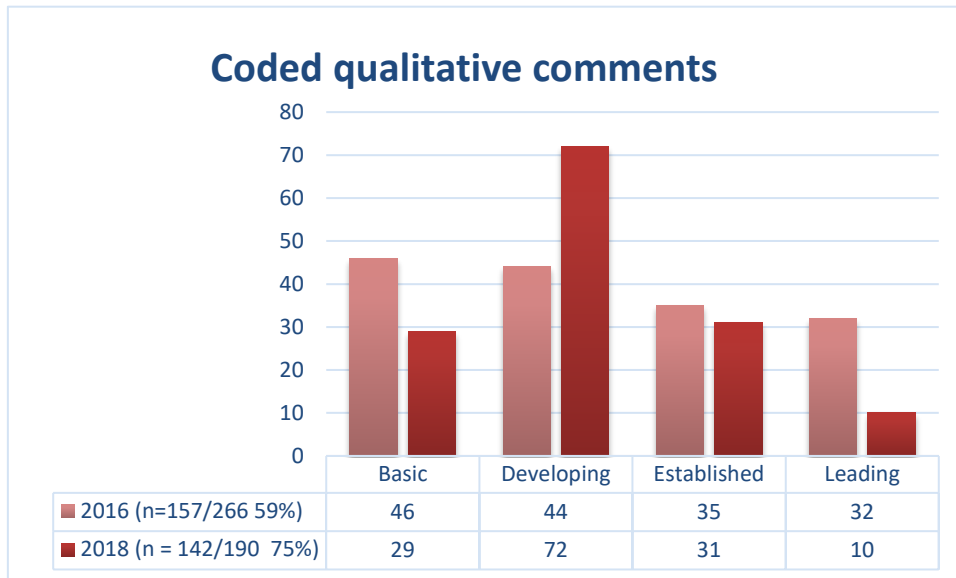|	Basic	Developing	Established	Leading
2016 (n=157/266 59%)	46	44	35	32
2018 (n = 142/190 75%)	29	72	31	10

FIGURE 3 : NUMBER OF COMMENTS CODED TO RESEARCH MATURITY LEVELS FOR 2016 AND 2018

As Figure 3 shows, there has been an increase in the number of comments that can be coded, as well as a shift from the basic to developing indicated. The comments coded to leading have dropped in part because two key agencies

who contributed to the 2016 survey did not participate in 2018. This suggests the importance of information gatekeepers as well as the potential cyclical nature of utilisation readiness, capacity and maturity.

Once the coding of the qualitative comments was checked for inter-rater reliability between the three authors, they were reinserted into the database and then used to assess if there were any differences on the items outlined in this report. When comparing means on utilisation maturity framework the figure below shows the mean differences which yielded statistically significant differences on perceptions of agencies as learning organisations[ii] as well as perceptions of the industry being engaged in learning[iii]. In addition responses on the utilisation maturity framework also yielded statistically significant results for perceptions of effectiveness in (i) disseminating research[iv]; assessing and evaluating research[v] implementing any changes needed[vi]; putting in place monitoring processes to track changes[vii] as well as evaluating outcomes of changes made as a result of research[viii] (see Figure 6). Finally an assessment was also made of the barriers reported on the combined factor scores. This indicated that those with higher levels of reported utilisation maturity reported significantly less concern regarding barriers to connecting the research to agency business[ix] (see Figure 7).

My home agency exemplifies a learning organisation (i.e. one that learns by experience of its own members or the experience of others)

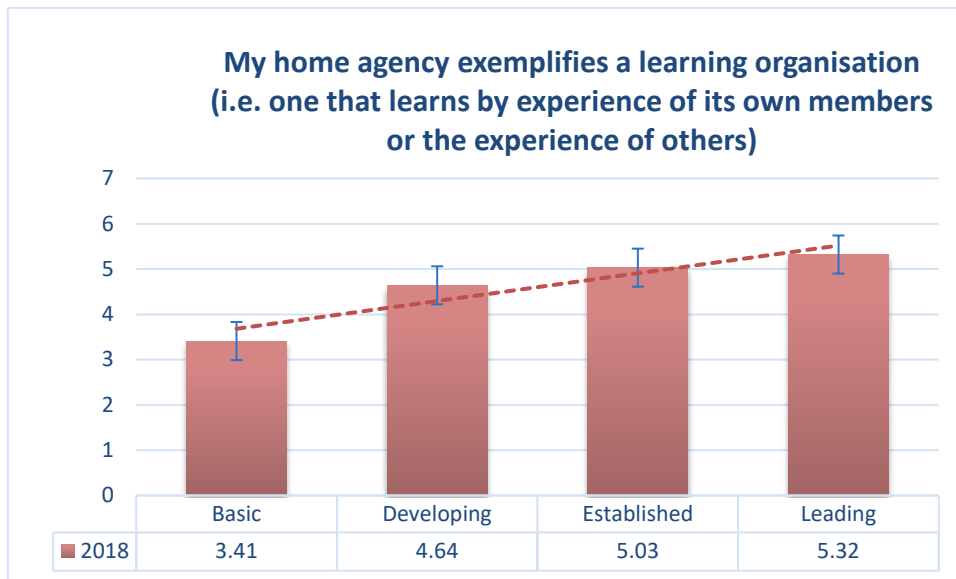|	Basic	Developing	Established	Leading
2018	3.41	4.64	5.03	5.32

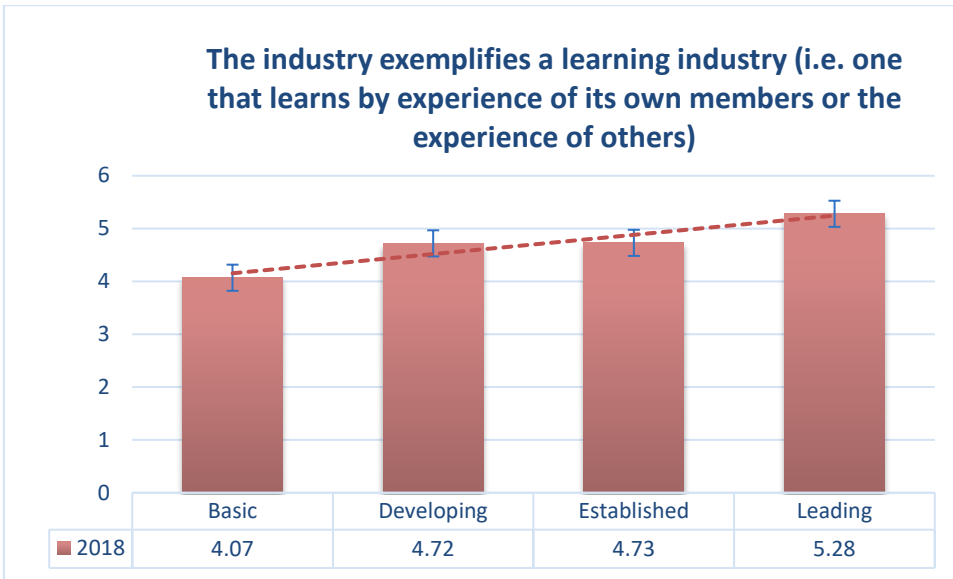FIGURE 4 : MEAN COMPARISON FOR PERCEPTIONS OF AGENCY AS LEARNING ORGANISATION

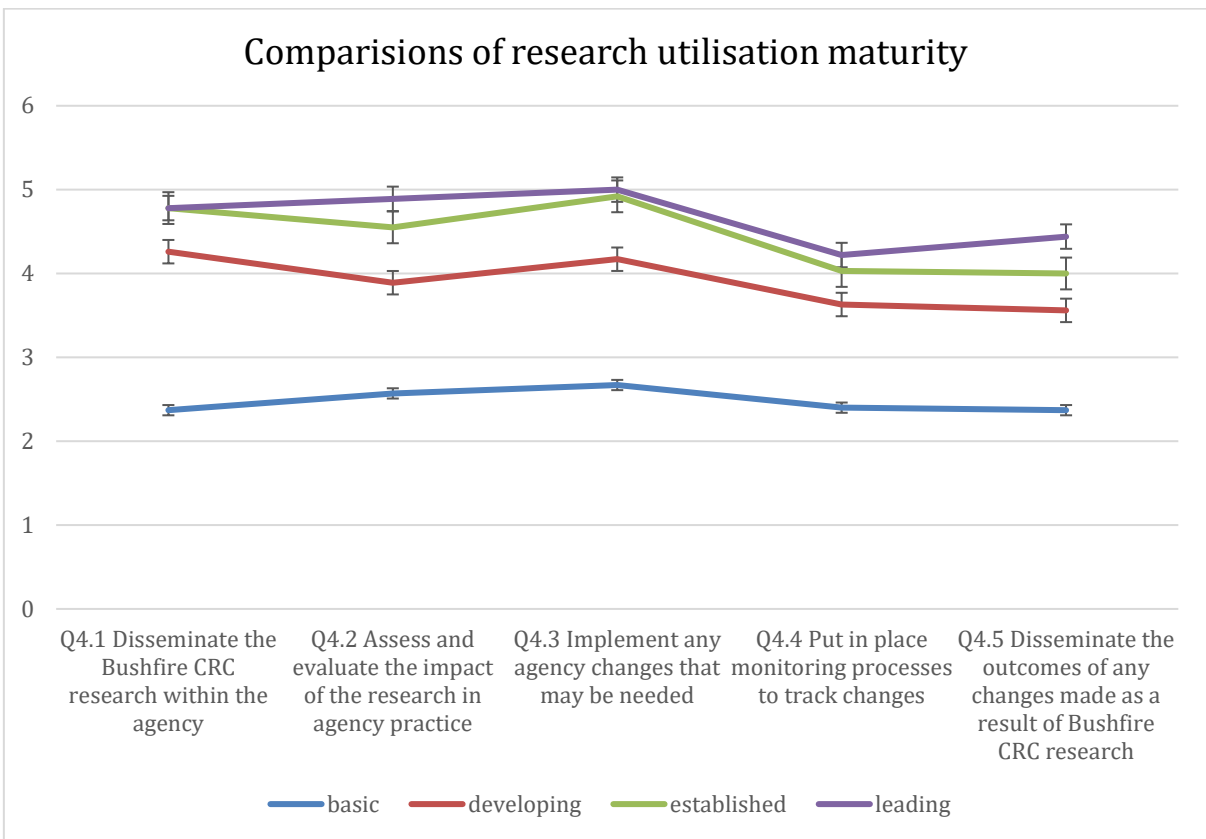FIGURE 5 : MEAN COMPARISON FOR PERCEPTIONS OF AGENCY AS LEARNING ORGANISATION

FIGURE 6 : MEAN COMPARISONS FOR UTILISATION PROCESSES FOR UTILISATION MATURITY 2018
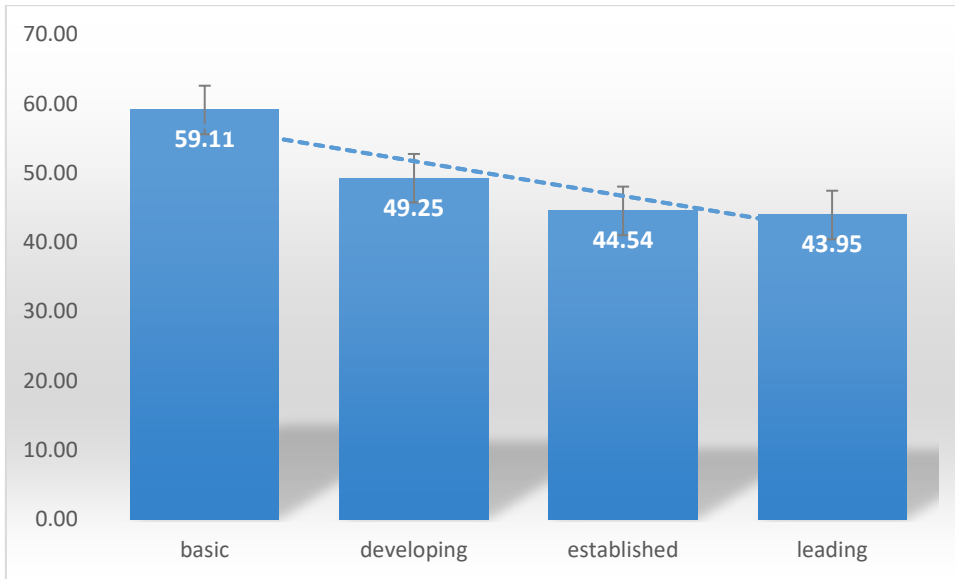
FIGURE 7 : MEAN COMPARISONS FOR BARRIER OF CONNECTING RESEARCH TO AGENCY BUSINESS FOR UTILISATION MATURITY

Agencies reporting higher levels of utilisation maturity are also reporting less problems particularly the first barrier, connecting research to agency business.

A thematic evaluation of the aggregated comments within each of the research utilisation maturity codes suggested the following profiles for the tentative framework (See Table 5). The matrix developed by KIRUN is illustrated in Error! Reference source not found. It should be noted that codes were based on only what the participant had recorded, meaning that the participants agency may be more active but this was not articulated in the comment. During 2017 the KIRUN AFAC group worked with these findings and developed a research utilisation maturity matrix, which has been presented to industry group [add in BNHCRC 2017 conference as well as Learning Forum 2017) and published following peer review (Owen, Krusel, Bearman & Brooks (2017; Owen 2018).

This 2018 survey provided the opportunity to continue the theory development –theory testing loop by seeking input from respondents on a number of indicators written based on the matrix. As can be seen the matrix consisted of five elements, two with sub-components. Each of the items was developed into a statement and piloted with end-users from the KIRUN group. The possible indicators were reviewed for duplication and the 2018 survey included 36 items. These findings suggest that the approaches discussed by those in the higher research utilisation maturity group may provide insights for others. Leading agencies were ones that had:

Established governance processes. They have established governance processes where business goals include research review (e.g. such as having a research review committee and a research framework as part of the business strategy). They also have active connections between research engagement and operations.

Utilisation embedded into job roles. People have responsibilities for learning and review built into their job roles and into their group work. There is a widespread expectation that all personnel are responsible for learning and innovation and will adopt evidence-informed processes. This is supported by access to professional development opportunities.

Active testing of outputs. They actively engage in testing outputs rather than accepting off-the-shelf products. They consult widely and know where to go for help and can access networks of expertise (internal or external to the agency) when needed.

Communities of practice. They are actively engage in agency and sector communities-of-practice (including other industries such as health) to communicate and innovate. They recognise that there are no magic solutions and they are able to articulate what is not known, problematic or uncertain that needs investigation. They recognise that learning is a process of continuous improvement.

Work will continue to further explore these for underlying dimensions to ascertain if key elements can be developed into a reliable scale that may be used in the future to assist agencies to self-assess their own research utilisation maturity. Working with agencies in this process of self-evaluation will yield some useful insights for others continuing on the research utilisation journey.

TABLE 5: QUALITATIVE THEMES IN STRATEGIES TO KEEP UP TO DATE WITH RESEARCH

Level 1 –agencies rely on individual effort to keep up to date with research. Research may be disseminated, through email for example, but insights or discussions or review is separated from daily activities. Little or no systematic organisational processes are in evidence – organisational engagement is either absent or passive Strategies may exist but these are unconnected to daily business processes. There is a tacit expectation that a "solution" to an agency's problem will be presented that is capable of being fully operationalised without organisational effort.
Level 2 agencies have processes in place to disseminate findings to a wide audience within the agency but are unlikely to go much further. Some individuals and even organisational units might be highly involved and motivated, but this is not yet fully embedded across the whole of agency. Those engaged in research utilisation within the organisation are likely to be at the top of the organisation's hierarchy with limited information flows to the front line. There is likely to be involvement in organised partnerships. There is readership of information that is disseminated. There is little or no analysis or impact assessment.   The agency is interested in what other agencies are doing and are likely to adopt other agency policies rather than to bespoke their own. Research utilisation strategy is partially but not fully articulated. The approach, however is rather aspirational and is largely reactive. Less discernment or processing of "what does this mean for us". Learning and problem-solving are likely to happen "on the fly".

Level 3 agencies have active engagement is research activities and are members of project teams; they attend RAF and individuals are tasked with research assessment tasks that are part of their job role responsibilities. They have good process to disseminate research and hold discussions regarding the implications. These may be centred at the top of the hierarchy though there are specific processes of review. They understand the problems they face for which research might have some insights but they may also be constrained by a political context that limits their ability to openly discuss the complexity or uncertainty of their problems. They are willing but not yet fully able to articulate what is unknown to them and may need to maintain a façade of control and certainty.

Level 4 agencies have active connections between research engagement and operations. They are comfortable with an expectation of an evidence base and understand the problems that they face. The have established organisational processes for implementation and change management. They have organisational norms that encourage challenge to established practices or alternatives. They consult widely and know where to go for help and can access networks of expertise (internal or external to the agency) if needed. Opportunities from new knowledge are grabbed and fully processed. People have responsibilities for learning and review build into their job roles and into their group work. There is a widespread expectation that all personnel are responsible for learning and to adopt evidence-based processed. They have a high comfort level with managing, reviewing and evaluating research. They create time within their organisation to think, understand and review new knowledge so that it may be embedded into organisational processes. They have systematic business strategies that are aligned with research review. They recognise that there are no magic solutions and they are able to articulate what is not known, problematic or uncertain. They also recognise that this is a process of continuous improvement.

CONCLUSION

The differences reported between agency hierarchical roles suggests communication between senior management, middle management and front-line service roles needs attention. While it is reasonable to conclude that the onus of decision-making to determine if a change in practice is warranted will remain with senior personnel, if those in front-line positions are not as familiar with research outputs, it will be difficult for them to bring the required changes into practice. A focus on dissemination of research outputs to those responsible for front-line service delivery may be helpful.

In addition, agencies reporting higher levels of research utilisation maturity provide insights for others. It is important to recognise that change and innovation is developmental and requires adjustments to governance processes, job responsibilities and participation in communities-of-practice. These findings indicate that it may be possible to develop an adapted scale of organisational maturity to assess and measure research utilisation. Further research would identify agency profiles of maturity in research utilisation so that appropriate supports can be facilitated.

Implications for future research from these findings suggest there is a need to tease out the elements that comprise learning and innovation cultures and what skills, processes and structures are needed. Further work is needed to better understand how perceived barriers can be overcome in order to increase and strengthen cultures of learning within agencies and the sector. Doing so will support goals of agility and innovation within the sector through research utilisation, which include the acceleration of adoption, maximising the value of research and increasing the worthiness of innovation.

It is vital that agencies – and the sector – builds capability in developing robust processes of deliberative review, assessment and evaluation so that evidence-informed practice can be demonstrated. This is necessary if the sector and involved agencies are to reap the full benefits of research.

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ATTACHMENT 1: STATISTICAL ANALYSES

Factor Analysis

A factor analysis was conducted using Principal Components Analysis and Varimax (orthogonal) rotation, with factor loadings (weightings) above 0.40 visible (as per Field, 2009), and with items sorted to reflect the relative strength of loadings per factor. The Kaiser-Meyer-Olkin (KMO) measure verified the sampling adequacy for the analysis, KMO = .781 (very good, according to Field, 2009).

An initial analysis was run to obtain eigenvalues for each component in the data. four components were identified and in combination explained 61% of the variance in response patterns, well above the standard of 50% (Field, 2009).

KMO and Bartlett's Test[a]

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.781
Bartlett's Test of Sphericity	Approx. Chi-Square	531.450
	df	105
	Sig.	.000

a. Only cases for which Survey year = 2018 are used in the analysis phase.

Table 6: Factor Analysis Total Variance Explained

Total Variance Explained[a]

Component	Initial Eigenvalues Total	% of Variance	Cumulative %	Extraction Sums of Squared Loadings Total	% of Variance	Cumulative %	Rotation Sums of Squared Loadings Total	% of Variance	Cumulative %
1	5.175	34.498	34.498	5.175	34.498	34.498	2.823	18.823	18.823
2	1.473	9.822	44.320	1.473	9.822	44.320	2.524	16.826	35.649
3	1.424	9.490	53.810	1.424	9.490	53.810	2.051	13.676	49.324
4	1.109	7.392	61.202	1.109	7.392	61.202	1.782	11.877	61.202
5	.927	6.177	67.379						
6	.865	5.764	73.142						
7	.778	5.184	78.326						
8	.664	4.424	82.750						
9	.630	4.197	86.947						
10	.497	3.314	90.261						
11	.420	2.803	93.064						
12	.363	2.423	95.487						
13	.329	2.197	97.683						
14	.212	1.414	99.098						
15	.135	.902	100.000						

Extraction Method: Principal Component Analysis.

a. Only cases for which Survey year = 2018 are used in the analysis phase.

Table 7: Factor Analysis Scree plot

Scree Plot

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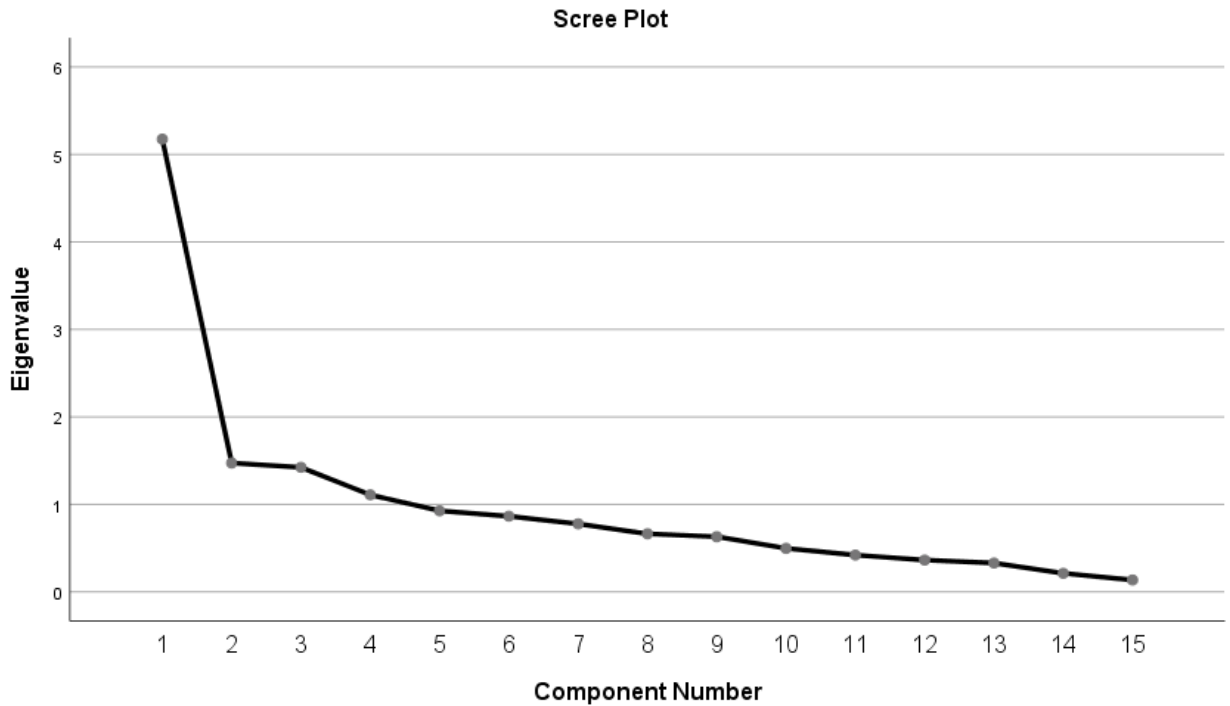
i Principal Components Analysis and Varimax (orthogonal) rotation, with factor loadings (weightings) above 0.40 visible (as per Field, 2009). The Kaiser-Meyer-Olkin (KMO) measure verified the sampling adequacy for the analysis, KMO = .803 (excellent, according to Field, 2009). An initial analysis was run to obtain eigenvalues for each component in the data.

ii Analysis of Variance between groups $(F_{(3, 283)} = 22.375, p < .0005, \omega = .43$

iii Analysis of Variance between groups $(F_{(3, 278)} = 7.504, p < .0005, \omega = .26$

iv Analysis of Variance between groups $(F_{(3, 293)} = 33.582, p < .0005, \omega = .50$

v Analysis of Variance between groups $(F_{(3, 276)} = 31.074, p < .0005, \omega = .49$

vi Analysis of Variance between groups $(F_{(3, 278)} = 29.302, p < .0005, \omega = .48$

vii Analysis of Variance between groups $(F_{(3, 273)} = 23,206, p < .0005, \omega = .44$

viii Analysis of Variance between groups $(F_{(3, 280)} = 29.318, p < .0005, \omega = .48$

ix Analysis of Variance between groups $(F_{(3, 76)} = 9.059, p < .0005, \omega = .48$