Advancing visitor research uptake in policy and practice: a structural equation model

Liandi Slabbert[a,b],* and Elizabeth Ann Du Preez[a]

[a]Department of Marketing Management, University of Pretoria, Lynnwood Road, Hatfield, Pretoria, 0002, South Africa
[b]Tourism Development and Marketing Division, South African National Parks, Pretoria, South Africa

*Corresponding author. South African National Parks, 643 Leyds street, Pretoria, 0002, South Africa. Email: liandi.slabbert@gmail.com; liandi.slabbert@sanparks.org

ABSTRACT

A great deal of visitor research is being produced, yet sub-optimal use thereof in practice raises concerns. This study is the first to measure actual levels of utilisation of visitor research in tourism and recreation management, using protected areas as context. It investigates seven potential drivers of use including the adaptation of research outputs; organisational context; dissemination efforts by researchers; engagement between practitioners and researchers; linkage mechanisms; skills, capacity and awareness of practitioners, and the timing of the research. A structural equation model was developed and tested using data collected from 252 producers of visitor research. The online survey results empirically confirm other scholars' beliefs of the underutilisation of research in protected area policies and practices. Engagement between the researcher and practitioner communities and the potential absorptive capacity of protected areas contribute significantly to increased research uptake levels. The importance of both the interaction and organisational interest explanations in knowledge utilisation is confirmed. Managerial implications are discussed along with recommendations for future research.

KEYWORDS: Knowledge utilisation, tourism, research-practice gap, visitor research, absorptive capacity, structural equation modelling

Introduction

Tourism research activity has increased exponentially during the past two decades (Chambers, 2018). Yet, there is a growing concern that research remains underutilised by policy-makers and practitioners, despite the field's applied nature (Mair et al., 2014). Discrepancies and inefficiencies between the production and utilisation of tourism research have been noted by Hudson (2013), Pyo (2012), Thomas (2012) and Xiao and Smith (2007). Some have even described the tourism sector as being research-averse (Cooper et al., 2015).

As popular tourism destinations, protected areas (PA) are no different. The gap between research and practice has contributed to challenges in implementing strategies, policies and practices related to visitor experiences (McCool, 2012); and detachment between visitor research and park management tools (Darcy et al., 2007). Others have expressed concerns about the uncoordinated efforts in collecting data about visitors (Buckley et al., 2008; Moore & Hockings, 2013); contributing to management decisions often being based on

unreliable or no information (Blahna et al., 2020). Even though researchers continually collect data about PA visitors, understanding its uptake into management strategies and practices remains fragmented. We broadly define visitor research as data and information that enhance our understanding of visitor characteristics, perceptions and behaviours; use patterns, and; the benefits and impacts of visitation to PAs.

Visitor research plays a significant role in effective planning and management of protected areas (PA) (Griffin et al., 2008; Marion, 2016; McCool, 2012; Newsome et al., 2013; Wardell & Moore, 2004). Full comprehension of the nature and diversity of visitor expectations and experiences is as necessary to responsible PA management as understanding the biodiversity and biophysical processes occurring within the area of use (McCool, 2006). Visitor management, a challenging and 'wicked' problem (Manning et al., 2017; McCool & Stankey, 2003), requires effective collaboration between researchers and management (McCool, 2012). However, many of the decision-makers in PAs come from a background of environmental management (Blahna et al., 2020), and as such, find the dual demands of biodiversity and tourism experience mandates challenging (McCool & Khumalo, 2015; Newsome et al., 2013; Weaver & Lawton, 2017). An apparent decline in PAs' internal research capacity poses an additional threat to evidence-based decision-making (Roux et al., 2019). The effect of COVID-19 on tourism incomes may put further pressure on PAs' abilities to retain skilled researchers and scientists within their ranks (Hockings et al., 2020). Should this decline in internal capacity continue, PAs will be even more dependent on external research partners to deliver actionable research, magnifying the need for effective collaboration and co-learning (Roux et al., 2006) between different stakeholders.

Acknowledging that various factors may influence visitor research utilisation – what can we do to improve the application of existing and new research in PA management decision-making? We know little about the extent and drivers of actual utilisation in PAs. Such understanding could help both knowledge producers and end-users to put forward solutions that improve current levels of utilisation; enhancing the contribution that visitor research makes in management policies and practices.

This article investigates visitor research utilisation in tourism and recreation management, using protected areas as context. It utilises data collected from a survey among 252 producers of visitor research to measure the actual level of use. It then applies structural equation modelling to test the relationships between utilisation and a set of seven theoretical constructs, hypothesised to improve utilisation. Notwithstanding the varying geographical and experiential contexts where research is produced worldwide, the outcomes lead to a novel explanation for the use of visitor research in PAs and an articulation of the status quo globally.

Literature review

Measuring knowledge utilisation

Knowledge utilisation is defined as whether and to what extent sources of evidence are utilised in management or policy decisions (Xiao & Smith, 2007). Serious theoretical, conceptual and methodological gaps have been noted in the area of measurement and

evaluation of knowledge utilisation, even though a plethora of research is available to frame our understanding thereof (Estabrooks et al., 2011).

Past studies have taken an input-output model approach through, for example, the information utilisation questionnaire by Larsen (1981), the level of use scale by Hall et al. (1975), the behavioural, affective and cognitive use instrument by Anderson et al. (1981) and the USER instrument by Menon and Wilcox (1994). As such, scholars have not been critical of the unwarranted assumptions and problems in methodologies associated with the input-output model. According to Landry et al. (2003) and Rich (1997), these include the lack of a definitive construct for the dependent variable 'use'; problems associated with the selection of independent variables; and the view that use is a discrete event. Certain inherent beliefs are also problematic. These include the assumption that a cause–effect relationship exists between a specific piece of research and the end-user's objective; that information use is directly linked to a particular action; and that it is appropriate and possible to measure the influence of a single piece of evidence on the problem-solving abilities of an individual. Lastly, there is a perception that problem-solving is affected mainly by information. The former does not depend on a single piece of evidence and research evidence does not generate just one effect, therefore viewing knowledge utilisation as a discrete decision is problematic (Landry et al., 2003; Rich, 1997).

Researchers have attributed such methodological challenges to the fact that ' … there is not yet an integrated conceptual model used by the experts in the field of knowledge utilisation … ' (Landry et al., 2003, p. 192). Knowledge utilisation should be thought of as a decision-making process, capturing the extent to which research has contributed to influencing a particular goal or desired result (Landry et al., 2003). For this reason, from an evaluation perspective, the concepts or terms such as 'influence', 'use' and 'impact' require measurable constructs that acknowledge the different types of knowledge use. 'Use' may refer to the reception and cognition of research, but does not guarantee to understanding. At the same time, 'influence' implies information has contributed towards a decision or an activity or led to alternative interpretations. 'Impact' on the other hand places the focus on an action-orientated outcome, implying that information usage is followed by an action (even if the action is to reject the information) (Rich, 1997). While definitions of knowledge utilisation along a spectrum of applications are useful, it does not describe the complexity accompanying the process, mainly the range of uses from the transmission to actual application.

Scholars Knott and Wildavsky (1980) addressed this challenge by conceptualising utilisation as a process rather than a single event and whose scale was later adapted by Landry et al. (2001). Since its inception, this scale has proven to be reliable and relevant in numerous empirical studies (Belkhodja et al., 2007; Cherney et al., 2013; Cherney & McGee, 2011; Cherney, Head, et al., 2012; Cherney, Povey, et al., 2012; Ion et al., 2019; Landry et al., 2003). Utilisation encompasses six cumulative stages, starting with the transmission, or the transfer of research outputs. Cognition, or practitioner understanding of the research results, builds on transmission and is followed by reference, or actions where practitioners and professionals refer to the research in reports, studies, and strategies. The next stage, referred to as effort, involves practitioners' actions to adopt the research outputs. The final stages involve influence and application. Influence happens when the research has

influenced the choices and decisions of end-users. Application is said to have occurred when the research gave rise to applications and extension in management activities.

Development of the theoretical model

Knowledge utilisation as the dependent variable was contextualised in the previous section. This section presents the theoretical model and the independent variables of this study. Just as there is no umbrella conceptual framework for utilisation, there is also no definitive list of variables to predict it (Cherney, Povey, et al., 2012); perhaps because of the contextual differences seen in different academic disciplines (see Cherney et al., 2013; Landry et al., 2001). We examined a long list of variables found to affect the level of research use in different contexts (see Amara et al., 2004; Belkhodja et al., 2007; Cherney et al., 2013; Cherney & McGee, 2011; Cherney, Head, et al., 2012; Cherney, Povey, et al., 2012; Crona & Parker, 2011; de Goede et al., 2012; Ion et al., 2019; Landry et al., 2001; Landry et al., 2003; Ouimet et al., 2009; van der Arend, 2014). These works corroborate the existence of six main interpretations of the influencers of research use.

Push models promote the idea of researchers driving knowledge forward in a linear direction towards practitioners for uptake, whether relevant to their context or not. In pull models, practitioners present researchers with real-life problems who translate them into research objectives to develop solutions (Rosenberg & Nathan 1982; Yin & Moore, 1988). Dissemination interpretation represents additional efforts required to transfer knowledge from producers to end-users through measures employed by researchers such as making reports available or adapting research reports to a format that practitioners can digest (Belkhodja et al., 2007; Landry et al., 2001). The engineering interpretations ascribe utilisation to the attributes of the research outputs and methods used (Amara et al., 2004). Interpretations of organisational interest highlight the influence that certain organisational traits and interests have on utilisation, including the context, interests and skills of the end-users themselves (Cherney et al., 2013; Landry et al., 2003). The two communities analogy (Caplan, 1979), viewed as flawed by Newman and Head (2015), argues the two culturally opposing environments of researchers and practitioners are to blame for the unsatisfactory levels of utilisation of research. The analogy's main idea is that the research-practice gap, caused by conflicting ideas, values, expectations and objectives of researchers and practitioners, can be overcome by employing specific mechanisms (described as bridges and vehicles) (Xiao & Smith, 2007). Conversely, the interaction interpretations propose that strong relationships between practitioners and researchers are major drivers of knowledge utilisation (Dunn, 1980; Landry et al., 2001; Oh, 1997; Yin & Moore, 1988). The interaction explanations have gained much traction in empirical studies (Amara et al., 2004; Belkhodja et al., 2007; Crona & Parker, 2011; de Goede et al., 2012; van der Arend, 2014). While those mentioned earlier produced promising results, the application of social science research cannot be explained by this theory alone.

No empirical studies appear to be available to guide conceptual thinking on visitor research use in PAs. To contextualise the array of potential factors found in literature, we tapped into the collective knowledge of a panel of visitor research and visitor management experts from various countries, during an earlier phase of the larger study (article under review). The results of a two-round Delphi survey revealed five main variables as likely influencers. We

included an additional two variables from literature, resulting in seven constructs, connecting with the six interpretations; as subsequently discussed.

Importance of adaptation of research outputs to suit end-user needs

Adaptation of research outputs to better suit the needs of practitioners is essential to overcome the gap created by differing contexts of the two communities (Amara et al., 2004; Cherney et al., 2013; Cherney & McGee, 2011; Landry et al., 2001; Landry et al., 2003). Huberman and Thurler (1991) suggested various mechanisms in this respect, including making reports more readable and understandable to end-users; operationalising recommendations; adjusting research outputs to suit the practitioner's expectations and address the deliverables of a project, and; improving the presentation of reports. Experts have also highlighted a need for research outputs to be delivered in line with end-users' expectations and datasets to be made available to end-users (under review). The dissemination interpretations support the idea of the adaptation of research outputs as an influencer to overcome the two communities challenge.

Organisational context of the PA

The presence of certain conditions within an end-user's organisational context can influence knowledge use. Organisational factors proven to contribute significantly towards utilisation include the user's context (Amara et al., 2004), the relevance of research in policy decisions (Landry et al., 2003), and the importance of the availability of internal and external funding for research (Cherney, Head, et al., 2012; Landry et al., 2001). In terms of organisational culture, increased use levels are observed when the research was regarded as a preferred source of information by practitioners (Belkhodja et al., 2007). Similarly, organisations with a culture that supports research for policy-making at various levels (van der Arend, 2014) and those that embrace adaptive management principles in visitor management (Marion, 2016; Newsome et al., 2013) may be more successful in absorbing research. Leadership support at a high level also plays a role (Hemsley-Brown, 2004), as do organisational politics (Ottoson, 2009). These factors link to both the organisational interest and demand-pull theories of knowledge utilisation.

The importance of dissemination activities

Dissemination methods such as meetings, workshops and forums are valuable communicative tools that bring about a shared understanding of the objectives, progress and outcomes of the research among the two communities (Landry et al., 2001; van der Arend, 2014). Dissemination activities improve awareness and transparency and encourage collaboration which enhances the usability of the research. Researchers can synthesise large volumes of research outputs in presentations or reports, saving managers time (van der Arend, 2014). Such methods link to the dissemination theory, which proposes that additional efforts are required to transmit research outputs to practitioners. When viewed as a transactional cost, it implies that the higher the costs incurred by researchers, or the more significant the dissemination efforts, the lower the costs experienced by practitioners and the greater the utilisation level (Landry et al., 2001).

Engagement between researchers and practitioners

The significance of public use data is fully revealed when park and tourism managers become dependent on it for their work (Eagles, 2002). Scholars increasingly agree that committed relationships and exchanges between researchers and practitioners, along with joint research efforts, lead to more functional knowledge (Heinsch et al., 2016). Effective alignment between research needs and actions that consider both the needs of the end-user and the organisation as a whole, produce mutually beneficial research outputs that narrow the research-practice gap (Amara et al., 2004; Belkhodja et al., 2007; Cherney & McGee, 2011; Cherney, Head, et al., 2012; Crona & Parker, 2011; Landry et al., 2001; Ouimet et al., 2009; van der Arend, 2014). In ecosystem management, scholars have advocated for shared understandings and co-production of new knowledge between the entities involved (Roux et al., 2006). Similarly, McCool (2012) put forward a model of micro-systems processing, represented as a series of interactions between researchers and managers, as the driving force behind knowledge transfer and understanding between the two communities (McCool, 2012). Apart from the importance of catering to practitioner and organisational needs, a clear articulation of the organisation's research needs and collaboration and trust between researchers and practitioners, also play a role (Roux et al., 2006). The engagement between researchers and practitioners described above relate to the interaction and organisational interest interpretations of knowledge utilisation.

Importance of linkage mechanisms between researchers and practitioners

Researchers have established that linkage mechanisms, such as informal personal contacts, participation in committees, workshops and meetings, are valuable interactive predictors of research use (Cherney et al., 2013; Cherney & McGee, 2011; Cherney, Head, et al., 2012; Cherney, Povey, et al., 2012; Landry et al., 2001; Landry et al., 2003; van der Arend, 2014). The more resources academia allocates towards these types of linkage mechanisms, the higher the research use levels. Like the dissemination efforts, the greater the sacrifice made by academia in terms of time and resources, the more utilisation improves (Landry et al., 2001). Linkage mechanisms reside within the interaction explanations of knowledge utilisation.

Skills, capacity and awareness of practitioners

Practitioners' awareness and recognition of research value are positively associated with research use in public sector organisations (Ouimet et al., 2009). Some have conceded that tourism practitioners pay little attention to academic publications and rely more on intuition and experience to make decisions (Xiao & Smith, 2007). Studies have also found a link between an organisation's research capacity and its research utilisation (Belkhodja et al., 2007). In PAs, the unsystematic manner in which data has been collected have suppressed information flow (Moore & Hockings, 2013), and contributed to managers basing their decisions on unreliable or no information (Griffin et al., 2008). A lack of formal frameworks to assist with the management, dissemination and utilisation of knowledge across various departments within PA agencies, has led to inadequate skills and resources required to interpret and apply research effectively in policy and practice (Booth, 2006; Buckley et al. 2008; Darcy et al., 2007; Lovelock et al., 2011). Combined, these components align strongly

with the concept of absorptive capacity, which is an organisation's ability to identify, take in and fully understand, and optimally use knowledge (Tanriverdi & Venkatraman, 2005). The importance of absorptive capacity in improving research utilisation has been studied in a tourism context (Olszewski & Bednarska, 2016) and public-sector organisations with environmental mandates (McCulloch, 2016; Murray et al., 2011). Absorptive capacity aligns to organisational interest explanations and demand-pull interpretations.

Timing of the research

Research outputs are better accepted and assimilated by practitioners for use in policies and practices when they become available at just the right point in time, making it more relevant (Cherney & McGee, 2011; Landry et al., 2001; Olszewski, 2015). Data needs to reach PA practitioners in a time that is complimentary to their responsibilities (Eagles, 2002). Research results are timed right in two ways. Firstly, coincidental where the research just happened to be produced at a time where managers needed it. Secondly, purposeful, when management research needs are made known to researchers through close collaboration, who actively pursues useful and timely intelligence (Manning, 2011). Research timing aligns with various interpretations, including engineering, demand-pull and interaction explanations.

No studies could be found that describe the (i) advancement of the body of visitor knowledge in PAs through the different stages of utilisation, or (ii) its determinant factors. The next section describes our approach to investigate these areas.

Methods

Sampling and data collection procedures

Researchers involved in the collection, analysis, and/or reporting of visitor research for protected areas were surveyed. Several knowledge utilisation scholars have also used the researcher community as target population (see Cherney & McGee, 2011; Ion et al., 2019; Landry et al., 2001). A database of researchers who published peer-reviewed articles during the years 2014 through 2018 served as a basis of the sampling framework. The authors expanded the list by identifying additional qualifying individuals, including those who had published visitor research after 2018. Additionally, snowball sampling was employed by requesting participants to circulate the survey link among fellow qualifying researchers. Usability of the questionnaire was tested through a pilot study and adjustments made before distributing the online survey link (hosted on SurveyMonkey®), via email to the target audience. Data were collected during the period of October 2019 to January 2020.

The authors obtained ethical clearance from the University's Committee for Research Ethics (Protocol number: *Anonymised*). Participants were informed of the purpose of the study and a list of conditions related to informed consent provided. These included voluntary participation in the study; and anonymity and confidentiality to all participants. Individuals could stop participation at any point in time without any negative consequences.

Survey instrument

The questionnaire consisted of 15 structured questions. These included five screening questions that captured categorical data related to an individual's involvement in visitor research in the preceding five years, type of role assumed (embedded or external researcher), research tasks performed and the categories of PAs dealt with. Four other categorical questions captured supplementary experiential and geographical background on the respondents, namely, years of experience engaging with PA practitioners and professionals, size categories of PAs they've worked with, country of residence and year of birth to determine age. The remaining questions captured ordinal data using matrix-style scales to measure the theoretical constructs.

The level and movement of the body of research through different utilisation stages, representing the dependent variable (KU), was measured using the widely applied knowledge utilisation scale developed by Landry et al. (2001). The index comprises six stages of utilisation assessed on a five-point scale measuring frequency, ranging from 1 (never) to 5 (always) (Appendix 1). Since most researchers assume different roles in various projects throughout their careers, the wording of the statements was adjusted from 'my research results' to 'the results of the work' to include data from all projects they were involved in and not just those they led. The authors added up an individual's responses to each stage, to calculate a total ranging from a minimum of 6 to a maximum of 30 (after Belkhodja et al., 2007).

Several indices were developed or adapted from previous research, to measure the seven constructs representing the independent variables. A description of the items included in each scale, and the measurement thereof is provided in Appendix 1. To measure the perceived importance of adaptation of research outputs (ADAPT), a modified scale adopted from Cherney, Povey, et al. (2012) was used. The newly developed scale, CONTEXT, or context of the PA, represents the perceptions (of the researcher) about numerous conditions or organisational circumstances in the particular PAs the respondent worked in. The perceived importance of dissemination efforts (DISSE) was measured using Cherney, Povey, et al. (2012)'s scale. The level of engagement between PA practitioners and researchers was measured using two items from the user's context scale by Landry et al. (2001) combined with three items arising from interviews with experts (under review). Combined, the five items represent the level of engagement between the two communities. Measurement of the perceived level of importance of linkage mechanisms between researchers and practitioners (LINKA) involved an adaptation of the scales conceptualised by Cherney, Povey, et al. (2012) and Landry et al. (2001). SCA, or skills, capacity and awareness of practitioners, measures how often a researcher found PA practitioners to possess the necessary skills and resources required to interpret and apply the research effectively, along with practitioners' awareness of the importance of research in decision-making (Belkhodja et al., 2007; Ouimet et al., 2009). TIMING consisted of a single item measuring a researcher's perception of whether their research outputs reached practitioners at just the right time.

Data analysis

This study used structural equation modelling (SEM) to explore the hypothesised linkages between knowledge utilisation and seven potential drivers. This multivariate statistical analysis technique has become a popular and important tool in social sciences (Hair et al., 2012), including the field of tourism (Nunkoo et al., 2013), with widespread applications in knowledge management. A covariance-based SEM (CB-SEM) was performed in two steps using SPSS and AMOSv25. Deciding whether theoretical constructs should be treated as formative or reflective in SEM analysis is a common challenge in tourism research (see Mikulić & Ryan, 2018). In our model, constructs were treated as reflective. The formative/reflective dilemma is addressed again in the discussion section of this article.

Step 1: measurement model analysis

In this step, scale reliability and validity were assessed, followed by construct validity and examination of the measurement model's parameters. Each scale was constructed to test a particular identified construct, independent of the other, and was not considered sub-dimensions of an overall construct.

The authors examined six scales for *construct validity* (Nusair & Hua, 2010). Exploratory Factor Analyses (EFA) for each of the scales were performed separately to assess whether the range of items put forward to make up a particular dimension of a construct is highly correlated to one another (Bolarinwa, 2015). Suitability of the data for factor analysis was determined using the criteria of Bartlett's test of sphericity ($p < 0.05$) and the Kaiser-Meyer-Olkin (KMO) measure (>0.60) (Tabachnick & Fidell, 2007). The criteria for a satisfactory standardised factor loading for individual items in each scale is usually between 0.5 and 0.9; however, values between 0.3 and 0.5 were still considered acceptable (Chin, 1998; in Nusair & Hua, 2010). *Internal consistency reliability* (Kline, 2015) was firstly tested by calculating Cronbach's alpha values with the criteria set at a value ≥ 0.6 (Hair et al., 2010); or Guttman Split-Half Coefficient in the case of two-item scales with values ≥ 0.6 (Benton, 2015). Secondly, composite reliability (CR) measures were calculated. CR values between 0.60 and 0.70 are regarded as acceptable in exploratory research, with values between 0.70 and 0.90, ranging from satisfactory to good (Hair et al., 2019).

Confirmatory factor analyses (CFA) were performed to assess the *convergent validity* of two existing scales (KU & DISSE) (Suhr, 2006). The extent to which the model fits the data was determined by examining eight goodness-of-fit indices representing different measurements. The first was the relative / normed chi-square ($\chi 2$/df), with a value smaller than three indicating distinct constructs (Hooper et al., 2008). The Comparative Fit Index (CFI) assumes that all latent variables are unrelated (independent model) and compares the sample covariance matrix with this independent model (Hooper et al., 2008). A CFI value of 0.90 or more is considered an acceptable model fit (Hu & Bentler, 1999). Similarly, the Incremental Fit Index, or IFI, and the Goodness of Fit Index (GFI), should be greater than 0.90 for a good fit (Bentler & Bonett, 1980). Root Mean Square Error of Approximation (RMSEA) is linked to residual in the model; with a value of 0.08 or less indicating acceptable model fit (Browne & Cudeck, 1993). Likewise, the Standardised Root Mean Residual Square (SRMR), a measure of the mean absolute covariance residual, should be 0.08 or less for an

acceptable fit (Hu & Bentler, 1999). Lastly, lower values of the Akaike information criterion (AIC) (Akaike, 1974) and Bayesian information criterion (BIC) (Stone, 1979) indicate a better fit when a model is compared to alternatives.

Next, the authors assessed the *construct validity of the measurement model* by examining *convergent* and *discriminant validity*. A CFA was performed to validate the factor structure of the measurement model (Pallant, 2016). The overall model fit was evaluated using the same goodness-of-fit indices and criteria discussed earlier. The variance–covariance matrix estimated in the first attempt (Model 1) did not properly replicate the sample variance–covariance matrix. The measurement model was modified and assessed again (Model 2).

Additional model parameters were also assessed. Standardised factor loading values are expected to exceed 0.3 and be statistically significant, with higher values suggesting better indications of the observed variables for the latent variable (Kline, 2015; Lei & Wu, 2007). Standardised residual variances (error variances) reveal the amount of variance in the item attributed to error. The criteria for an acceptable error variance is a z-value between −2.58 and 2.58 in the case of large samples (Field, 2009). Last, the R-square, or R^2 values were inspected for a minimum acceptable level of 0.25. These indicate the amount of true variance in the item as a result of the latent variable (Kline, 2015).

Tests of *discriminant validity* seek to find evidence that one concept is different from other closely related concepts. Discriminant validity of the latent constructs in the measurement model is commonly assessed in SEM analysis by examining the square root of the average variance extracted (AVE). Recently, authors have motivated for an alternative and superior technique for measuring discriminant validity. We used the heterotrait-monotrait ratio of correlations (HTMT) to test for discriminant validity as an alternative to AVE (Voorhees et al., 2016). Strictly speaking, the HTMT should be lower than 0.85, or lower than 0.90 as a more lenient criterion (Henseler et al., 2015).

Step 2: structural model analysis

In this step, the structural model was assessed for *convergent validity* and the model parameters investigated, followed by an examination of the structural pathways between the dependent and the independent variables (Nusair & Hua, 2010). Following measurement model modification, CFA was performed again, and the overall model fit was evaluated against the goodness-of-fit indices, succeeded by an investigation of the model parameters described earlier (standardised factor loadings, standardised residual variances and R^2). The final step was to examine whether correlations between variables are consistent with the hypothesised links, using path analysis. The statistical significance, size, and direction (positive/negative) of the gamma (γ) values were inspected to describe the relationships between dependent and independent variables. A gamma value between 0.1 and 0.3 represent a small effect size; between 0.3 and 0.5 a medium effect; and ≥ 0.5, a large effect (Field, 2009).

Table 1. Types of researchers and their levels of experience in visitor research and protected areas (*n* = 252).

Item		Frequency (percentage)	Item		Frequency (percentage)
Involvement in visitor research on different continents (multiple answers possible)	Africa	49 (19%)	Type of researcher	External researcher or consultant	195 (82%)
	Asia	34 (13%)		PA staff member	40 (17%)
	Australasia	27 (11%)		Other	11 (5%)
	Europe[a]	124 (49%)	Sizes of PAs worked with (multiple answers possible)	Less than 50,000 visitors per year	121 (55%)
	North America[a]	72 (29%)		50,000–1,99,999 visitors per year	117 (53%)
	South America	18(7%)		2,00,000–9,99,999 visitors per year	93 (42%)
	Antarctica	1 (0.4%)		1 million+ visitors per year	106 (48%)
Types of visitor research involved in (multiple answers possible)	Socio-demographic attributes	195 (77%)	Number of years engaging with PA practitioners	No direct engagement	6 (3%)
	Psychological attributes	84 (33%)		Less than a year	6 (3%)
	Travel arrangements	90 (35%)		1–5 years	58 (25%)
	Visitor use patterns	194 (75%)		6–10 years	56 (24%)
	Visitor experience outcomes	154 (60%)		More than 10 years	103 (45%)
	Visitor impacts	150 (59%)			
Research tasks involved in (multiple answers possible)	Design	188 (79%)	Involvement in different categories of PAs (multiple answers possible)	(I) Nature reserve	124 (53%)
	Data collection	194 (81%)		(II) Wilderness area	69 (30%)
	Analysis	217 (91%)		(III) National park	182 (78%)
	Reporting	205 (86%)		(IV) National monument/feature	59 (25%)
	Recommendations	186 (78%)		(V) Habitat/species management area	67 (29%)
	Engaging with practitioners	142 (59%)		(VI) Protected landscape or seascape	105 (45%)
	Implementation	61 (26%)		(VII) PA with sustainable resource use	104 (45%)

[a]Iceland included in Europe and Central American countries included in North America.

Results

Characteristics of the sample

The survey results produced 252 useable responses. The ratio of indicators to latent variables was 4, which requires a sample size of at least 100 for adequate analysis (Westland, 2010). In addition, our ratio of sample size to free parameters was 252:55, which converts into 4.6:1, which is close to Bentler's (1989) rule of thumb of a ratio of 5:1. The sample size was therefore considered adequate for SEM analysis.

Nearly all (82%) of the researchers surveyed were external to protected areas, some were employed by PAs (17%), but only 3% were affiliated with both. They were mainly experienced, with a median age of 45.6 years and 69% having six or more years' direct experience. Collectively they represent researchers engaging with a diversity of visitor research and different types and sizes of PAs, from those with less than 50,000 visitors to areas with millions of visitors per year.

Two-thirds of respondents said they had worked with three or more types of visitor research. Almost 80% of respondents had crafted recommendations for practitioners, but the number of researchers who engaged directly with practitioners dropped to 59%. Only 17% of respondents had been tasked with all seven responsibilities; however, most (82%) had performed a minimum of four responsibilities. A little more than a quarter (26%) of respondents said they were involved in implementing research recommendations (Table 1).

The movement of visitor research through the stages of utilisation

The movement of visitor research through the six stages is best understood looking at the percentage of respondents said to have 'passed' each stage of utilisation successfully (Table 2). Only respondents who scored a minimum of 3 ('sometimes') were labelled as having passed a particular stage (after Cherney & McGee, 2011). The percentage of those who passed decreases from 91% of respondents who successfully transmitted research results, to 67% who said end-users had applied the results. One does not need to have passed all levels to reach the final stage – application (Cherney, Povey, et al., 2012), as utilisation is not a linear movement. We observe this in our results as well, as 67% of respondents passed stage 6, although only 55% passed all six stages.

Table 2. Distribution by stage of utilisation (*n* = 252).

Stages of utilisation	1 Never *n* (%)	2 Rarely *n* (%)	3 Sometimes *n* (%)	4 Usually *n* (%)	5 Always *n* (%)	Passed the stage *n* (%)	Mean and (SD)
Transmission	5 (2%)	18 (7%)	55 (21%)	81 (32%)	91 (38%)	91%	3.96 (1.03)
Cognition	4 (2%)	31 (12%)	91 (36%)	98 (38%)	21 (12%)	87%	3.48 (0.91)
Reference	10 (4%)	45 (18%)	102 (40%)	74 (29%)	25 (10%)	79%	3.23 (0.98)
Effort	14 (5%)	52 (20%)	108 (42%)	70 (27%)	12 (5%)	74%	3.05 (0.95)
Influence	17 (7%)	54 (21%)	117 (46%)	58 (23%)	10 (4%)	72%	2.96 (0.93)
Application	24 (9%)	59 (23%)	108 (42%)	55 (21%)	10 (4%)	67%	2.88 (0.98)
Respondents who passed all six stages						55%	

Large percentages of respondents realised the stages of reference, effort, influence and application only some of the times (40%, 42%, 46% and 42%, respectively). Only 32% of respondents reported PA managers usually make an effort to adopt the results or recommendations of their work. Less than a third (27%) of researchers said the results

usually led to decisions being influenced, and only 25% reported practitioners and professionals usually applied the results.

It is further observed that the means realised for each stage of utilisation were generally higher than those achieved in other academic fields (Ion et al., 2019; Landry et al., 2001).

The level of knowledge utilisation can also be evaluated from the respondents' position in terms of experience in working with PA practitioners (Table 1). While more than three-quarters of respondents had crafted recommendations for practitioners, much less of them reportedly engaged directly with practitioners (59%).

Testing the measurement model

Reliability and validity tests were performed separately for each of the individual scales. The results are summarised in Table 3. . Four items (A2, A3, C4, C5) and one construct (LINKA) were removed due to reliability or structural issues in the model. A more detailed description of the refinement of the scales is provided in Appendix 2.

Table 3. Results of the exploratory factor analyses and reliability tests performed separately for each of the individual constructs**.**

Factors and items	Factor loading	Notes
Knowledge utilisation (KU) *(KMO=0.848; Bartlett's test of sphericity p < 0.001). Eigenvalue = 3.838; % of Variance = 57.22%. Internal consistency reliability achieved with scale α = 0.884.*		
Transmission	.637	
Cognition	.727	
Reference	.659	
Effort	.827	
Influence	.863	
Application	.797	
Adaptation of research outputs (ADAPT after removal of A2 & A3) *(KMO = 0.779; Bartlett's test of sphericity p < 0.001). Eigenvalue = 2.488; % of Variance = 37.96%. Internal consistency reliability after removal of A2&A3 with scale α = 0.744.*		
(A1) Readability and comprehensiveness of reports	.469	Retained.
(A2) Specific, operational nature of conclusions or recommendations		Removed due to low factor loading (λ = .417).
(A3) Provision of data that can be analysed by end-users		Removed due to low factor loading (λ = .368).
(A4) Sensitivity to end-users' expectations	.574	
(A5) Presentation / packaging of reports	.584	
(A6) On-time delivery of results to end-users	.651	
(A7) Attention to deliverables	.765	
Dissemination (DISSE) *(KMO = 0.720; Bartlett's test of sphericity p < 0.001). Eigenvalue = 2.284; % of Variance = 44.42%. Internal consistency reliability achieved with scale α = .746.*		
(D1) Meetings to plan the scope of projects with end-users	.535	
(D2) Meetings to report on a study's progress	.676	
(D3) Meetings to discuss findings with end-users	.848	
(D4) Organising dissemination activities for end-users	.560	
Skills, capacity and awareness of practitioners (SCA) *(KMO = 0.50; Bartlett's test of sphericity p < 0.001). Eigenvalue = 1.437; % of Variance = 43.594%. Reliability measured with Guttman Split-Half Coefficient = 0.608.*		
(S1) Practitioners have the necessary skills and resources required to interpret and apply my research / data effectively	.660	
(S2) Practitioners are aware of the importance of collecting data about visitors to inform management decisions	.660	
Context of the PA (CONTEXT after removal of C4 & C5) *(KMO = 0.712; Bartlett's test of sphericity p < 0.001). Eigenvalue = 1.927; % of Variance = 31.472%. Internal consistency reliability achieved after removal of C4 & C5 with α = 0.638.*		
(C1) My work is supported by a champion higher up in the PA agency or government department	.500	
(C2) The PA agencies I work with exhibit a policy environment that encourages innovation, change and improvement in visitor services	.569	

(C3) Funding is available to PAs for implementing the recommendations of my work	.483	
(C4) Internal politics within PA agencies prevent the uptake of my visitor research or data		C4&C5 formed their own factor but with very low Cronbach α (0.3). C4 was reverse scored, but Cronbach α still too low. On closer inspection C5 was not related to internal organisational conditions. Both items excluded.
(C5) My work is relevant to local or regional policy decision makers		
(C6) I receive institutional support of my work at all levels	.672	
Engagement (ENGAGE) *(KMO = 0.773; Bartlett's test of sphericity p < 0.001). Eigenvalue = 2.442; % of Variance = 36.07%. Internal consistency reliability achieved with scale α = 0.734.*		
(E1) My work coincides with the needs and expectations of practitioners and professionals	.590	
(E2) Practitioners attribute credibility to my work	.600	
(E3) My work is aligned with the objectives of the organisation	.629	
(E4) Practitioners articulate their research needs to me	.613	
(E5) Practitioners put my recommendations into action	.571	
Linkage mechanisms (LINKA) *(KMO = 0.648; Bartlett's test of sphericity p < 0.001). Eigenvalue = 1.802; % of Variance = 27.924%. Internal consistency reliability not achieved (α = 0.591).*		
(L1) Informal contacts with staff and professionals	.342	Low factor loadings and internal consistency reliability < 0.6. Excluded from model.
(L2) Participation in committees, seminars and workshops	.490	
(L3) Sending reports to practitioners and professionals	.588	
(L4) Publication of articles in popular media	.644	

Note: The construct TIMING was a single-item construct whose validity and reliability could therefore not be established, hence not listed here.

After refinement, the constructs ADAPT, DISSE, CONTEXT, ENGAGE, SCA and TIMING were deemed valid and reliable and included in the measurement model. The hypothesised paths are visually depicted in Figure 1.

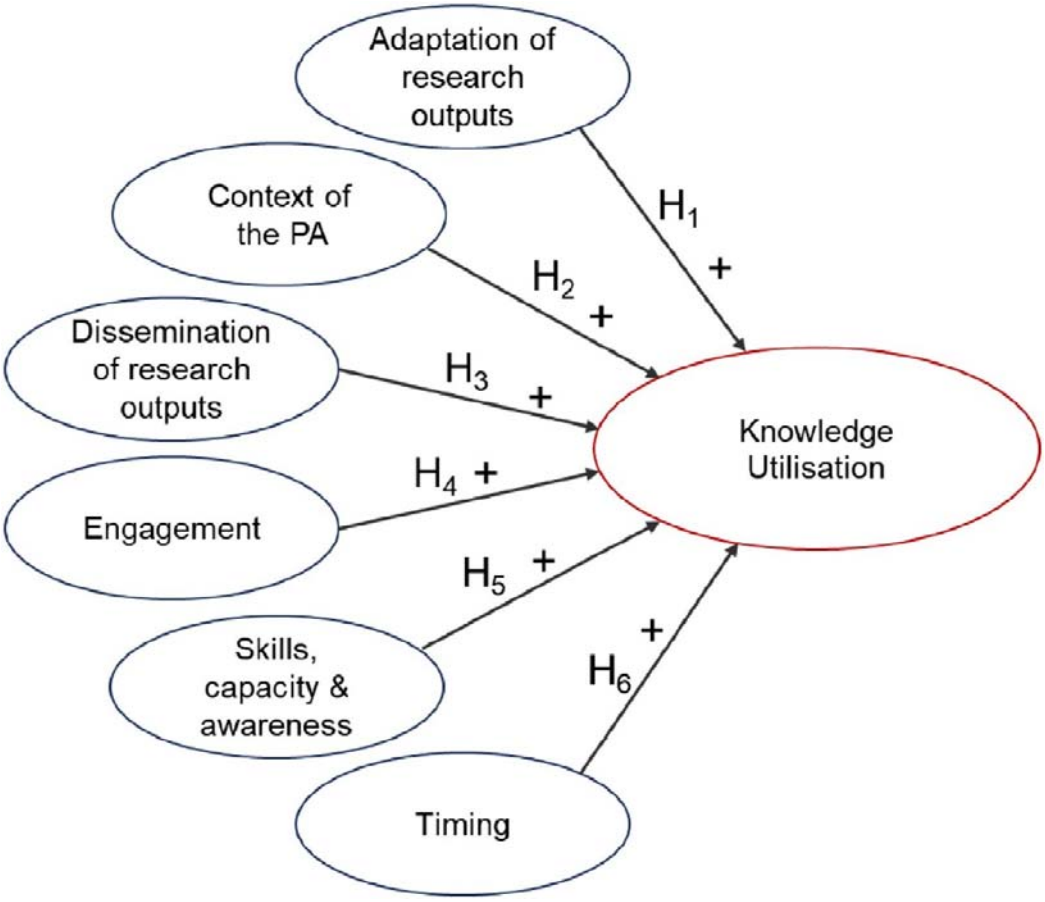

Figure 1. Proposed structural model with hypothesised links.

As an initial indication of whether relationships existed between knowledge utilisation (KU) and each of the hypothesised influential factors, Pearson's correlation coefficients and descriptive statistics of the latent variables are provided in Table 4.

Table 4. Pearson correlation coefficients between the final constructs**.**

Construct	ADAPT	CONTEXT	DISSE	ENGAGE	SKA	TIMING	KU
ADAPT							
CONTEXT	0.178***						
DISSE	0.522***	0.200***					
ENGAGE	0.386***	0.497***	0.295***				
SKA	0.66	0.507***	0.110	0.273***			
TIMING	0.360***	0.352***	0.339***	0.582***	0.264***		
KU	0.300***	0.462***	0.211***	0.624***	0.362***	0.462***	
Mean	4.18	3.13	4.14	3.74	3.46	3.37	3.26
Std dev	0.60	0.65	0.71	0.62	0.72	0.98	0.77

Note: ***p < 0.001; KU= Knowledge utilisation; ADAPT= Adaptation of research outputs; DISSE= Dissemination; SCA= Skills, capacity and awareness of practitioners; CONTEXT= Context of the PA; ENGAGE= Engagement; LINKA= Linkage mechanisms.

The correlation coefficient between KU and ENGAGE showed a moderate to strong positive relationship, with moderately positive relationships detected between KU and CONTEXT and KU and TIMING. Weak positive relationships are witnessed between KU and ADAPT, KU and DISSE and KU and SCA.

In our study, we tested two variations of the measurement model (Model 1 and 2). In Model 1, we included all six independent variables (ADAPT, CONTEXT, DISSE, ENGAGE, TIMING & SCA). After performing the CFA, the model fit statistics (Table 5, Model 1) indicated the variance–covariance matrix estimated by Model 1 did not properly replicate the sample variance–covariance matrix. The model was altered by removing the constructs TIMING and CONTEXT. This improved the model parsimony (Table 5, Model 2) by achieving an adequate model fit and subsequently construct validity.

Table 5. CFA fit statistics for the two measurement models.

Model fit statistics	Criteria	Model 1	Model 2
Independent variables included		ADAPT CONTEXT DISSE ENGAGE TIMING SCA	ADAPT DISSE ENGAGE SCA
$\chi 2$/df	≤3.00	1.981	1.962
CFI	>0.90	0.873	0.906
IFI	>0.90	0.875	0.907
GFI	>0.90	0.850	0.876
RMSEA	≤0.08	0.063	0.062
SRMR	≤0.08	0.094	0.0583
AIC		804,298	542,456
BIC		828,656	557,991
Result		Close but not adequate fit	Adequate fit

χ2/df: relative/normed chi-square; CFI: Comparative Fit Index; IFI: Incremental Fit Index; GFI: Goodness of Fit Index; RMSEA: Root Mean Square Error of Approximation; SRMR: Standardised Root Mean Residual Square; AIC: Akaike Information Criterion; BIC: Bayesian Information Criterion.

Table 6 provides the parameter estimates in terms of the standardised factor loadings, standardised residual variances and squared multiple correlations (R^2) for individual items in each construct, along with the composite reliability (CR) for each construct. The CR values for three constructs ranged from satisfactory to good, while that of SCA is still considered acceptable for exploratory research (Hair et al., 2019). The results, combined with the Cronbach's alphas (Table 3), indicate all of the constructs had good internal consistency. All the standardised factor loadings in Model 2 were statistically significant ($p < 0.05$) and ranged between 0.494 and 0.802, thus exceeding the minimum threshold of 0.3. The standardised residual variances were all statistically significant ($p < 0.05$). All of the R^2 values were above the minimum criteria of 0.25 (Kline, 2015), except for A1, which came close ($R^2 = 0.244$). The model was considered adequate as no parameter estimates were out of range.

Table 6. Analysis of model parameters.

Variable	Item	Standardised factor loadings	Standardised residual variances	R-square	Composite reliability
ADAPT	A1	0.494**	0.389**	0.244	0.750
	A4	0.613**	0.538**	0.375	
	A5	0.547**	0.502**	0.299	
	A6	0.638**	0.515**	0.407	
	A7	0.756**	0.296**	0.571	
DISSE	D1	0.591**	0.437**	0.350	0.758
	D2	0.674**	0.555**	0.454	
	D3	0.802**	0.321**	0.644	
	D4	0.571**	0.664**	0.326	
ENGAGE	E1	0.513**	0.416**	0.263	0.882
	E2	0.595**	0.424**	0.354	
	E3	0.556**	0.564**	0.309	
	E4	0.625**	0.649**	0.390	
	E5	0.675**	0.455**	0.455	
SCA	S1	0.646**	0.410**	0.417	0.608
	S2	0.677**	0.400**	0.458	

**$p < 0.05$.

To test the structural model's discriminant validity, the HTMT ratios were calculated (Voorhees et al., 2016). In our study, the HTMT of the constructs in Model 2 were all below the strict maximum threshold of 0.85 (Henseler et al., 2015) (Table 7). Moreover, the one-sided 95% percentile confidence interval of HTMT does not cover 1; that is, it is significantly different from 1. Discriminant validity was therefore reached.

Table 7. HTMT analysis of the measurement model**.**

	ADAPT	DISSE	ENGAGE	SCA	KU
ADAPT					
DISSE	0.708				
ENGAGE	0.520	0.395			
SCA	0.103	0.170	0.400		
KU	0.373	0.267	0.765	0.494	

Structural pathways

The final structural model was examined to test whether significant relationships existed between the dependent variable, KU and each independent variable (ADAPT, DISSE, ENGAGE & SCA). All independent variables were postulated to influence the level of KU positively. Notwithstanding the alternative model's satisfactory model fit statistics, the structural paths do not present an ideal situation. Only two of the four constructs in the final model were found to be significantly and positively related to the level of KU: Engagement (ENGAGE) between researchers and practitioners and the skills, capacity and awareness of practitioners to interpret and apply research effectively (SCA). The path coefficients (gamma or γ-values) of ENGAGE and SCA are shown in Table 8 and Figure 2.

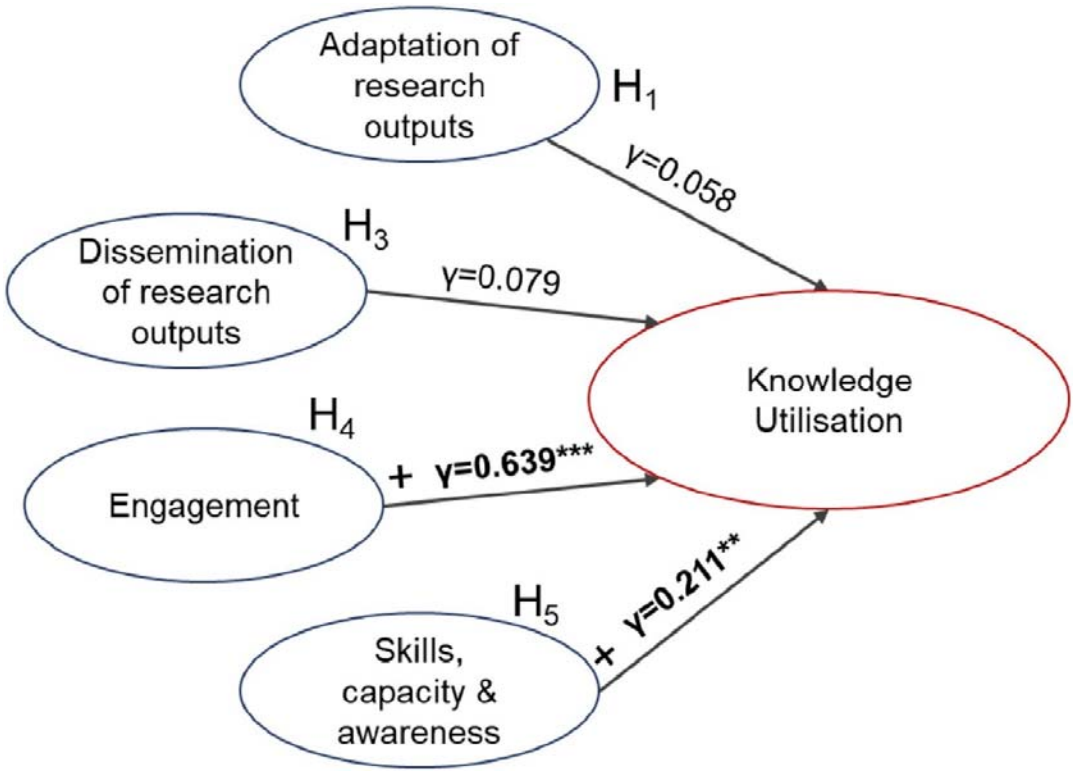

Figure 2. Revised structural model with path coefficients

Table 8. Path coefficients of the structural model**.**

Relationship	Path coefficient	SE	*t*-statistics	*p*-value
H_1: ADAPT → KU	0.058	0.179	0.323	0.746
H_3: DISSE → KU	0.079	0.110	−0.718	0.473
H_4: ENGAGE → KU	0.639	0.118	5.425	<0.001***
H_5: SCA → KU	0.211	0.089	2.373	0.018**

**p < 0.05; ***p < 0.001.

Based on the size of the coefficients and the guidelines by Field (2009), we observe that engagement had a large effect size on KU ($\gamma \geq 0.5$) while the skills, capacity and awareness of practitioners exhibited a small effect size on KU ($\gamma < 0.3$). There were no effects of perceived importance of adaptation of research outputs and dissemination activities on the level of KU.

Discussion

The use of visitor research by protected areas

Similar to what was noted by Buckley et al. (2008), levels of utilisation vary considerably across different PAs or PA systems, some being very successful at integrating research findings into practice, while others struggle. These 'hit and miss' results seen in the

utilisation stages of reference indicate a large proportion of research is not absorbed into management decisions.

Compared with other sectors tested (Ion et al., 2019; Landry et al., 2001), the overall levels of utilisation appear to be higher. Tourism is an applied field of study (Mair et al., 2014), making it possible that tourism researchers are more aware of professionals and practitioners' needs and thus motivated to focus their research on real-life problems. Another possible explanation is provided by Hjalager (2002) who argued that public tourism authorities, such as PAs, are better positioned to source and use research than smaller tourism businesses due to a constant stream of income, economies of scale, and better-educated staff.

A sizable proportion of researchers reportedly do not engage directly with practitioners, even though most said they had made recommendations for practitioners. The use of visitor research in PAs demands a process that facilitates the transfer of understanding and knowledge, moving beyond just data and information (McCool, 2012). This requires meaningful, targeted cooperative interactions between researchers and practitioners and not just disseminating results by sending reports and hosting meetings (Roux et al., 2006).

In terms of predicting the level of utilisation, our results show the organisational interest and interaction interpretations, represented by two constructs in this study, explain the best use of research in PAs. We discuss the implications of these findings next.

Engagement between researchers and practitioners

Effective engagement is necessary (van der Arend, 2014) if applied research is to provide useful knowledge for managers of outdoor recreation (Manning, 2011). This study highlights the importance of taking a relationship-focussed approach involving meaningful, targeted, human interactions between researchers and practitioners (Roux et al., 2006). Relationships should advance towards a position where researchers understand and address end-users' and organisations' needs (Amara et al., 2004; Cherney & McGee, 2011). In this scenario, end-users also acknowledge academic research's value in shaping and inspiring institutional frameworks and long-term research goals (Newman & Head, 2015). Our engagement construct included elements of the articulation of research needs by end-users; researchers' work being aligned to the expectations and needs of end-users and aligned to the PA organisational objectives; practitioners assigning a certain level of credibility to researchers' work; and practitioners responding to the research results by implementing the recommendations.

Such productive engagement and collaboration result in more appropriate research questions, increased feasibility of research methods, and greater likelihood of practitioners implementing the recommendations. More importantly, constant interaction helps build both parties' capacity to collaborate more effectively (van der Arend, 2014). It reduces instances of demand-pull relationships where practitioners mostly solicit research for easily identifiable operational issues, ignoring deeper information needs; and push models where practitioners may feel alienated from the research forced onto them by researchers (Roux

et al., 2006). Therefore, it is not surprising that collaboration with users is touted as a requirement for funding research (Arnott et al., 2020).

A major stumbling block in researcher-practitioner relationships in PAs has been the reward systems found in academia, prioritising publications over solution-oriented discussions with practitioners (McCool, 2012), pointing towards the two communities' challenge. With academic researchers producing most visitor research, regular and close interactions drive knowledge transfer between the two communities (McCool, 2012). Newman and Head (2015) believe inroads have been made in this area with academic researchers adapting and embracing the demands for management research. They concede that existing linkages could be strengthened, research outputs could be better tailored to practitioners' needs, and practitioners need to acknowledge the value of academic research in shaping and inspiring institutional frameworks and long-term research goals.

The absorptive capacity of practitioners

Organisations with highly skilled practitioners, well-entrenched relationships with academia and a culture that values research are more likely to make evidence-based policy decisions (Newman & Head, 2015). For organisations to take full advantage of external research, they need internal absorptive capacity (Cohen & Levinthal, 1990). Two subcategories of absorptive capacity were first conceived by Zahra and George (2002) but have since been adapted in subsequent work by, among other, Camisón and Forés (2010). Potential absorptive capacity represents the measures taken by an organisation to value, acquire and assimilate new external knowledge. Realised absorptive capacity is the collective efforts to integrate and restructure existing and new knowledge into organisational systems and processes. Our study indicates that awareness among PA practitioners of the importance of acquiring new research for management decision-making plays a vital role in the level of research uptake in policies and practices. In general, tourism organisations are not well-equipped to acquire knowledge from academia, lacking awareness and understanding of the different ways academia could assist (Olszewski & Bednarska, 2016). It is questionable whether PA agencies possess the right skills to manage the dual demands of PAs biodiversity and tourism experience mandates (McCool & Khumalo, 2015).

Our results highlight the need to equip PA practitioners with the necessary resources and skills required to interpret and apply visitor research in management decisions. The higher the combined effect of these conditions, or the higher a PA's potential absorptive capacity, the higher the utilisation level. Potential absorptive capacity consists of acquisition and assimilation capacities (Camisón & Forés, 2010). Acquisition capacity is a PA's ability to find, identify, value and source external knowledge considered essential for its operations. Assimilation capacity is a PA's ability to absorb external knowledge and consist of several procedures and practices that enable new knowledge to be evaluated, processed, interpreted and understood. The finding that higher levels of skills and capacity in understanding research implications and identifying application areas lead to improved utilisation introduces a potential paradox. How do we expect practitioners to make sense of and apply the research outputs they received from academics when these research partnerships were often formed because PA managers did not possess these capabilities in the first place?

The answer might lie in the social dimensions of absorptive capacity. Absorptive capacity is made up of more than just the sum of individual subjects' capabilities (Turner, 2013). Social interactions between the producers and end-users of knowledge could build the absorptive capacity of PAs in numerous ways: (i) raising awareness of new research that become available; (ii) helping managers gain access to relevant research and sift through mountains of research effectively; (iii) assisting managers in formulating research agendas aimed at specific management objectives; (iv) supporting a more progressive research transmission process where outputs are also interpreted and even applied within the confines of the social interactions and (v) sensitising academic researchers about the needs of practitioners, who in turn educate the next generation of practitioners (van der Arend, 2014). These social interactions link to the engagement construct discussed earlier. More effective engagement between researchers and practitioners directly increases utilisation and improves absorptive capacity (McCulloch, 2016), indirectly raising the level of utilisation of research.

Relationships not proven

The final model was unable to prove relationships between (the importance of) adaptation and dissemination efforts and the level of knowledge utilisation. These findings are not entirely unexpected as other scholars yielded similar results after testing comparable constructs (Belkhodja et al., 2007; Cherney, Povey, et al., 2012). One can argue that the perceived importance of dissemination and adaptation of research outputs are not differentiators of knowledge use, as most researchers regarded adaptation and dissemination as important. We could not test three constructs: the importance of linkage mechanisms, timing, and the PA's organisational context. These factors could still play a pivotal role in the uptake of research as previous research suggests. Further investigation is needed to establish this fact.

The formative vs reflective dilemma

The construct measuring the importance of linkage mechanisms was used in this study as a reflective construct. In the analysis, the scale properties of this well-established construct resulted in it being excluded from the model. It could be argued that treating it as a formative construct might have been more appropriate. Similarly, other items were dropped from constructs representing organisational context and adaptation of research outputs, suggesting that a combination of reflective and formative indicators was present. Future studies should investigate this further and consult the guidelines provided by Mikulić and Ryan (2018) to establish whether a formative or reflective mode is more suitable.

Theoretical implications

This interdisciplinary study strengthens current knowledge utilisation theory and extends this knowledge into the field of tourism and recreation management. It quantifies the research-practice gap of the body of visitor research collected in PAs and reveals in which stages of utilisation those gaps are occurring. Its outcomes reaffirm the role of the organisational interest and interaction theoretical explanations while simultaneously forming a novel comprehension of research utilisation in the context of PA visitor management. Several new constructs were conceptualised to appraise the effect of seven

influencers, connecting to six major groups of theoretical explanations (Amara et al., 2004; Belkhodja et al., 2007; Landry et al., 2001). Engagement between researchers and practitioners in PAs was found to be a strong predictor of research use (Cherney et al., 2013). The role of absorptive capacity towards strengthening the utilisation of research (Tanriverdi & Venkatraman, 2005) was also confirmed. Although not significantly related to research utilisation, the construct describing the context of the PA is unique to this study in that it investigates and combines the effect of certain conditions in a PA organisation on research use. Refinement and validation of all of these constructs should be pursued in future and more clarity provided on whether each could be considered formative, to address the problem of possible misspecification (Mikulić, 2018).

Practical implications

The results have practical relevance to PAs and the research community toward closing the research-practice gap. There is a real need for committed relationships and exchanges between researchers and practitioners (Heinsch et al., 2016) toward mature levels of engagement. Managers and intermediaries should actively promote and facilitate closer engagement between PA staff and external researchers so both parties can learn to deal more effectively with each other by better understanding the other's objectives, viewpoints and skills they bring to the partnership. Research agendas should support management realities through academics becoming sensitised to the needs and challenges of practitioners (van der Arend, 2014). On the other hand, absorptive capacity of PAs could be strengthened by increasing practitioner awareness and access to existing knowledge, along with promoting better interpretation and application thereof (van der Arend, 2014). Capacity building can be facilitated through formal and informal training initiatives with the support of research institutions.

Complex and indistinct research outputs have to be filtered, systematised and adjusted prior to being absorbed in tourism operations (Hjalager, 2002). Using such measures, practitioners can be shown how academic research is relevant to their work and to the PA's objectives. After transmitting the results to end-users, academics usually acquit themselves from any further obligations (McCool, 2012), so the responsibility of systematising research outputs is passed onto the already overburdened managers since many PAs do not employ embedded tourism researchers (Farrell & Marion, 2002). To the researchers' defence, the many different levels, profiles and contexts encountered in the end-user community they interact with imply there is no standard audience of beneficiaries of research outputs. This makes systematising and adjusting research outputs challenging, particularly for those inexperienced in dealing with PAs' organisational structures (and politics). As a mechanism for engagement, embedded researchers help bridge this gap by assuming a knowledge brokers' role between researchers and managers, promoting and facilitating management-relevant research and providing insights into PAs unique challenges, advancing social capital among stakeholders (Roux et al., 2019). However, if internal research capacities are on the decline, as Roux et al. (2019) indicated, it leaves a significant gap in the step towards utilisation.

Another informal mechanism suggested for strengthening existing linkages is the employment of communities of practice (McCool, 2012; Roux et al., 2006). Communities of

practice introduce a knowledge interface level (Roux et al., 2006) where academic and non-academic stakeholders come together to listen to each other, share knowledge and experiences in a 'safe' environment, co-learn, adapt and ultimately apply the new knowledge (Reed et al., 2014). Such interactions also allow for the transfer of tacit knowledge (Roux et al., 2006), which is the undocumented, implicit knowledge based on experiences (Xiao & Smith, 2007). In turn, better utilisation stimulates more engagement between the parties and greater demand for research (Ouimet et al., 2009).

Conclusion and recommendations

This paper, the first to measure the level of research utilisation in the context of tourism and recreation, empirically confirms other authors' hypothesis of suboptimal levels of use of visitor research in practice (Buckley et al., 2008; Darcy et al., 2007; Griffin et al., 2008; Hudson, 2013; McCool, 2012; Moore & Hockings, 2013; Pyo, 2012; Thomas, 2012; Xiao & Smith, 2007). The results show that even though research in tourism and recreation appears to have advanced further than other academic disciplines, too little of it is absorbed into management decisions. The statement by Ritchie and Ritchie (2002, p. 451) ' … a great deal of research is being conducted in tourism, but is inefficiently used and rarely exploited to its full potential … ' still holds today. PAs might be at different stages of establishing and enhancing research partnerships with academia, some having already successfully mastered multiple initiatives. Researcher and practitioner communities from various countries stand to benefit from sharing examples of successful partnerships, initiatives and projects. Such knowledge is important for researchers and practitioners with a sincere aspiration to help PAs navigate through the complex challenges of visitor management. PAs, academia and funding organisations should encourage further conversations on this.

Limitations and future research

Data challenges include the fact that the study made use of self-reported data. This could have influenced the results due to social desirability biases among researchers who wish to portray a favourable level of utilisation of their research (Cherney, Head, et al., 2012; Davies et al., 2008). The representativeness of the sample of researchers could not be established as the size of the population of researchers is unknown. Also, the English-based questionnaire limited participation from non-English speaking researchers. Furthermore, three constructs could not be tested due to scale properties.

The paper introduces avenues for further research. There are many other factors influencing usage levels, in addition to the ones explored in our model. Research on this spectrum of influencers and their degree of influence in the context of tourism and recreation should be prioritised. Our model did not account for contextual differences between the PAs researchers worked in – different sizes, IUCN categories, geographical contexts, research capacity, funding mechanisms and visitor carrying capacity to name a few. Utilisation levels vary across different projects, PAs or PA systems; making an aggregated measurement such as the one reported here, less relevant in some circumstances. Future research could investigate the impact of such organisational attributes and circumstances. Also, the phenomenon could be studied from the practitioner's point of view rather than that of the

researcher. There is also much to be explored concerning the efficacy of communities of practice and capacity-building mechanisms to improve practitioners' absorptive capacity.

Acknowledgements

The authors would like to thank all respondents for taking the time to complete the questionnaire. A special thanks to Dr Pohl for her assistance in the statistical analysis. Our gratitude goes out towards the University of Pretoria for the postgraduate funding support provided.

Disclosure statement

This paper forms part of a series of papers from an unpublished PhD thesis. It should be noted that the lead author is employed by a protected area agency which could have influenced the research design, and the analysis and interpretation of the results. It could also have influenced the way individuals responded to the survey. The positivist approach taken ensured that research was, as far as possible, conducted in a value-free way. This implies that the data was captured objectively and not influenced by the researcher's interests. The study examined existing literature and theory to inform the selection of influencers investigated.

Funding

This work was supported by the University of Pretoria.

Notes on contributors

Liandi Slabbert oversees tourism research at the South African National Parks. She alternates between the worlds of management and academic research in support of strategic, tactical and operational decision-making. Her research interests include protected areas tourism, visitor research, visitor management, human-nature interactions, strategic market development and knowledge utilisation.

Elizabeth Ann Du Preez is a senior lecturer in the Department Marketing Management, University of Pretoria. Her research focuses on destination marketing and management, as well as consumer behaviour in varied destination contexts. Apart from academic research published in accredited journals she has also undertaken a number of industry-based research projects.

References

Akaike, H. (1974). A new look at the statistical model identification. *IEEE Transactions on Automatic Control*, *19*(6), 716–723. https://doi.org/10.1109/TAC.1974.1100705

Amara, N., Ouimet, M., & Landry, R. (2004). New evidence on instrumental, conceptual, and symbolic utilization of university research in government agencies. *Science Communication*, *26*(1), 75–106. https://doi.org/10.1177/1075547004267491

Anderson, C., Ciarlo, J. A., & Brodie, S. (1981). Measuring evaluation-induced change in mental health programs. In J. A. Ciarlo (Ed.), *Utilizing evaluation: Concepts and measurement techniques* (pp. 97–124). Sage Publications.

Arnott, J. C., Neuenfeldt, R. J., & Lemos, M. C. (2020). Co-producing science for sustainability: Can funding change knowledge use? *Global Environmental Change*, *60*, Article no. 101979. https://doi.org/10.1016/j.gloenvcha.2019.101979

Belkhodja, O., Amara, N., Landry, R., & Ouimet, M. (2007). The extent and organisational determinants of research utilisation in Canadian health services organisations. *Science Communication*, *28*(3), 377–417. https://doi.org/10.1177/1075547006298486

Bentler, P. M. (1989). *EQS, structural equations*. Program manual [Program version 3.0] (p. 6). BMDP Statistical Software.

Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin*, *88*(3), 588–606. https://doi.org/10.1037/0033-2909.88.3.588

Benton, T. (2015). An empirical assessment of Guttman's lambda 4 reliability coefficient. In R. E. Millsap, D. M. Bolt, L. A. Van der Ark, & W. C. Wang (Eds.), *Quantitative psychology research: The 78th Annual meeting of the psychometric society* (pp. 301–310). Springer.

Blahna, D. J., Kline, J. D., Williams, D. R., Rogers, K., Miller, A. B., McCool, S. F., & Valenzuela, F. (2020). Integrating social, ecological, and economic factors in sustainable recreation planning and decisionmaking. In S. Selin, L. K. Cerveny, D. J. Blahna, & A. B. Miller (Eds.), *Igniting research for outdoor recreation: Linking science, policy, and action* (pp. 173–188). US Department of Agriculture, Forest Service.

Bolarinwa, O. A. (2015). Principles and methods of validity and reliability testing of questionnaires used in social and health science researches. *Nigerian Postgraduate Medical Journal*, *22*(4), 195–201. https://doi.org/10.4103/1117-1936.173959

Booth, K. (2006). *Review of visitor research for the department of conservation: DOC research and development series 229*. New Zealand Department of Conservation.

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen, & J. S. Long (Eds.), *Testing structural equation models* (pp. 136–162). Sage.

Buckley, R., Robinson, J., Carmody, J. & King, N. (2008). Monitoring for management of conservation and recreation in Australian protected areas. *Biodiversity and Conservation*, *17*(14), 3589-3606. https://doi.org/10.1007/s10531-008-9448-7

Camisón, C., & Forés, B. (2010). Knowledge absorptive capacity: New insights for its conceptualisation and measurement. *Journal of Business Research*, *63*(7), 707–715. https://doi.org/10.1016/j.jbusres.2009.04.022

Caplan, N. (1979). The Two-communities theory and knowledge utilization. *American Behavioral Scientist*, *22*(3), 459–470. https://doi.org/10.1177/000276427902200308

Chambers, D. (2018). Tourism research: Beyond the imitation game. *Tourism Management Perspectives*, *25*, 193–195. https://doi.org/10.1016/j.tmp.2017.11.010

Cherney, A., Head, B., Boreham, P., Povey, J., & Ferguson, M. (2012). Perspectives of academic social scientists on knowledge transfer and research collaborations. *Evidence and Policy*, *8*(4), 433–453. https://doi.org/10.1332/174426412X660098

Cherney, A., Head, B., Boreham, P., Povey, J., & Ferguson, M. (2013). Research utilisation in the social sciences: A comparison of five academic disciplines in Australia. *Science Communication*, *35*(6), 780–809. https://doi.org/10.1177/1075547013491398

Cherney, A., & McGee, T. R. (2011). Utilisation of social science research: Results of a pilot study among Australian sociologists and criminologists. *Journal of Sociology*, *47*(2), 144–162. https://doi.org/10.1177/1440783310386831

Cherney, A., Povey, J., Head, B., Boreham, P., & Ferguson, M. (2012). What influences the utilisation of educational research by policy-makers and practitioners?: The perspectives of academic educational researchers. *International Journal of Educational Research*, *56*, 23–34. https://doi.org/10.1016/j.ijer.2012.08.001

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, *35*(1), 128–152. https://doi.org/10.2307/2393553

Cooper, C., Ruhanen, L., & Scott, N. (2015). Knowledge management in tourism: Are the stakeholders research-averse? In T. V. Singh (Ed.), *Challenges in tourism research* (pp. 309–337). Channel View.

Crona, B. I., & Parker, J. N. (2011). Network determinants of knowledge utilization: Preliminary lessons from a boundary organization. *Science Communication*, *33*(4), 448–471. https://doi.org/10.1177/1075547011408116

Darcy, S., Griffin, T., Craig, M., Moore, S., & Crilley, G. (2007, February 11–14). *Protected area visitor data collection and management: Emerging issues and gaps in current Australian practices* [Paper presentation]. CAUTHE 2007: Tourism-Past Achievements, Future Challenges, Manly, Australia.

Davies, H., Nutley, S., & Walter, I. (2008). Why 'knowledge transfer' is misconceived for applied social research. *Journal of Health Services Research & Policy*, *13*(3), 188–190. https://doi.org/10.1258/jhsrp.2008.008055

de Goede, J., van Bon-Martens, M. J. H., Putters, K., & van Oers, H. A. M. (2012). Looking for interaction: Quantitative measurement of research utilisation by Dutch local health officials. *Health Research Policy and Systems*, *10*(1), 1–12. https://doi.org/10.1186/1478-4505-10-9

Dunn, W. N. (1980). The two-communities metaphor and models of knowledge use: An exploratory case survey. *Knowledge*, *1*(4), 515–536. https://doi.org/10.1177/107554708000100403

Eagles, P. F. J. (2002). Tourism-use measurement and reporting in parks and protected areas. *Parks*, *12*(1), 3–10.

Estabrooks, C. A., Squires, J. E., Strandberg, E., Nilsson-Kajermo, K., Scott, S. D., Profetto-McGrath, J., Harley, D., & Wallin, L. (2011). Towards better measures of research utilisation: A collaborative study in Canada and Sweden. *Journal of Advanced Nursing*, *67*(8), 1705–1718. https://doi.org/10.1111/j.1365-2648.2011.05610.x

Farrell, T. A., & Marion, J. L. (2002). The protected area visitor impact management (PAVIM) framework: A simplified process for making management decisions. *Journal of Sustainable Tourism*, *10*(1), 31–51. https://doi.org/10.1080/09669580208667151

Field, A. (2009). *Discovering statistics using SPSS*. SAGE Publications.

Griffin, T., Moore, S., Darcy, S., & Crilley, G. (2008, October 14–19). *Developing a national approach to visitor data collection, management and use for protected areas: Thoughts from Australian research and practice* [Paper presentation]. Fourth International Conference on Monitoring and Management of Visitor Flows in Recreational and Protected Areas: Management for Protection and Sustainable Development, Montecatini Terme, Tuscany, Italy.

Hair, J. F., Black, W. C., Babin, B., & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). Pearson Prentice Hall.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2012). Partial least squares: The better approach to structural equation modeling? *Long Range Planning*, *45*(5-6), 312–319. https://doi.org/10.1016/j.lrp.2012.09.011

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, *31*(2), 2–24. https://doi.org/10.1108/EBR-11-2018-0203

Hall, G. E., Loucks, S. F., Rutherford, W. L., & Newlove, B. W. (1975). Levels of use of the innovation: A framework for analysing innovation adoption. *Journal of Teacher Education*, *26*(1), 52–56. https://doi.org/10.1177/002248717502600114

Heinsch, M., Gray, M., & Sharland, E. (2016). Re-conceptualising the link between research and practice in social work: A literature review on knowledge utilisation. *International Journal of Social Welfare*, *25*(1), 98–104. https://doi.org/10.1111/ijsw.12164

Hemsley-Brown, J. (2004). Facilitating research utilisation: A cross-sector review of research evidence. *International Journal of Public Sector Management*, *17*(6), 534–552. https://doi.org/10.1108/09513550410554805

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, *43*(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8

Hjalager, A. M. (2002). Repairing innovation defectiveness in tourism. *Tourism Management*, *23*(5), 465–474. https://doi.org/10.1016/S0261-5177(02)00013-4

Hockings, M., Dudley, N., Elliot, W., Ferreira, M. N., MacKinnon, K., Pasha, M. K. S., Phillips, A., Stolton, S., Woodley, S., Appleton, M., Chassot, O., Fitzsimons, J., Galliers, C., Kroner, R. G., Goodrich, J., Hopkins, J., Jackson, W., Jonas, H., Long, B., … Yang, A. (2020). Editorial essay: COVID-19 and protected and conserved areas. *Parks*, *26*(1), 7–24. https://doi.org/10.2305/IUCN.CH.2020.PARKS-26-1MH.en

Hooper, D., Coughlan, J., & Mullen, M. (2008, June 19-20). Evaluating model Fit: A synthesis of the structural equation modelling literature. In A. Brown (Ed.), *Proceedings of the 7th European Conference on research methodology for Business and management studies* (pp. 195–200). Academic Conferences and Publishing Limited.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: a Multidisciplinary Journal*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Huberman, M., & Thurler, G. (1991). *De la recherche à la pratique: Éléments de base* [From the research to the practice: elements of base]. Peter Lang.

Hudson, S. (2013). Knowledge exchange: A destination perspective. *Journal of Destination Marketing & Management*, *2*(3), 129–131. https://doi.org/10.1016/j.jdmm.2013.08.002

Ion, G., Stîngu, M., & Marin, E. (2019). How can researchers facilitate the utilisation of research by policy-makers and practitioners in education? *Research Papers in Education*, *34*(4), 483–498. https://doi.org/10.1080/02671522.2018.1452965

Kline, R. B. (2015). *Principles and practice of structural equation modelling*. Guilford publications.

Knott, J., & Wildavsky, A. (1980). If dissemination is the solution, what is the problem? *Knowledge*, *1*(4), 537–578. https://doi.org/10.1177/107554708000100404

Landry, R., Amara, N., & Lamari, M. (2001). Utilisation of social science research knowledge in Canada. *Research Policy*, *30*(2), 333–349. https://doi.org/10.1016/S0048-7333(00)00081-0

Landry, R., Lamari, M., & Amara, N. (2003). The extent and determinants of the utilisation of University research in government agencies. *Public Administration Review*, *63*(2), 192–205. https://doi.org/10.1111/1540-6210.00279

Larsen, J. K. (1981). Knowledge utilisation: Current issues. In R. F. Rich (Ed.), *The knowledge cycle* (pp. 149–168). Sage.

Lei, P. W., & Wu, Q. (2007). Introduction to structural equation modeling: Issues and practical considerations. *Educational Measurement: Issues and Practice*, *26*(3), 33–43. https://doi.org/10.1111/j.1745-3992.2007.00099.x

Lovelock, B., Farminer, A., Reis, A. C., & New Zealand Department of Conservation (2011). *A synthesis and gap analysis of research on visitors to public conservation areas in Australia, 1995–2010*. Department of Conservation.

Mair, J., Merton, E., & Smith, L. (2014, February 10–13). *Research into policy and knowledge co-generation in tourism* [Paper presentation]. CAUTHE 2014: Tourism and Hospitality in the Contemporary World: Trends, Changes and Complexity, Brisbane, Australia.

Manning, R. E. (2011). *Studies in outdoor recreation: Search and research for satisfaction*. Oregon State University Press.

Manning, R. E., Anderson, L. E., & Pettengill, P. (2017). *Managing outdoor recreation: Case studies in the national parks*. CABI.

Marion, J. L. (2016). A review and synthesis of recreation Ecology research supporting carrying capacity and visitor Use management decisionmaking. *Journal of Forestry*, *114*(3), 339–351. https://doi.org/10.5849/jof.15-062

McCool, S. F. (2006). Managing for visitor experiences in protected areas: Promising opportunities and fundamental challenges. *Parks: The International Journal for Protected Areas Managers*, *16*(2), 3–9.

McCool, S. F. (2012). Potential roles of research in enhancing the performance of management in securing high quality visitor experiences in wilderness. In D. N. Cole (Ed.), *Wilderness visitor experiences: Progress in research and management* (pp. 179–187). U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

McCool, S. F., & Khumalo, K. E. (2015). Empowering managers: Enhancing the performance of protected area tourism managers in the twenty-first century. *Tourism Recreation Research*, *40*(2), 169–180. https://doi.org/10.1080/02508281.2015.1039333

McCool, S. F., & Stankey, G. H. (2003, April 14–18). *Advancing the dialogue of visitor management: Expanding beyond the culture of technical control* [Paper presentation]. George Wright Society Biennial Conference, San Diego, California.

McCulloch, S. (2016). *Absorptive capacity for responding to environmental change: An assessment of three public-sector agencies* [Unpublished Master's dissertation]. Nelson Mandela University, George.

Menon, A., & Wilcox, J. (1994). *USER: A scale to measure use of market research*. Technical Working Paper No 94. Marketing Science Institute.

Mikulić, J. (2018). Towards an end of measurement misspecification in tourism research: Grammar of theoretical constructs, focus of thought and mind traps. *Tourism Management*, *68*, 444–449. https://doi.org/10.1016/j.tourman.2018.04.010

Mikulić, J., & Ryan, C. (2018). Reflective versus formative confusion in SEM based tourism research: A critical comment. *Tourism Management*, *68*, 465–469. https://doi.org/10.1016/j.tourman.2018.05.002

Moore, S., & Hockings, M. (2013). Australian protected areas and adaptive management: Contributions by visitor planning frameworks and management effectiveness assessments. *Australasian Journal of Environmental Management*, *20*(4), 270–284. https://doi.org/10.1080/14486563.2013.833487

Murray, K., Roux, D. J., Nel, J. L., Driver, A., & Freimund, W. (2011). Absorptive capacity as a guiding concept for effective public sector management and conservation of freshwater ecosystems. *Environmental Management*, *47*(5), 917–925. https://doi.org/10.1007/s00267-011-9659-7

Newman, J., & Head, B. (2015). Beyond the two communities: A reply to mead's "why government often ignores research". *Policy Sciences*, *48*(3), 383–393. https://doi.org/10.1007/s11077-015-9226-9

Newsome, D., Moore, S. A., & Dowling, R. K. (2013). *Natural area tourism: Ecology, impacts, and management*. Channel View Publications.

Nunkoo, R., Ramkissoon, H., & Gursoy, D. (2013). Use of structural equation modeling in tourism research: Past, present, and future. *Journal of Travel Research*, *52*(6), 759–771. https://doi.org/10.1177/0047287513478503

Nusair, K., & Hua, N. (2010). Comparative assessment of structural equation modelling and multiple regression research methodologies: E-commerce context. *Tourism Management*, *31*(3), 314–324. https://doi.org/10.1016/j.tourman.2009.03.010

Oh, C. H. (1997). Issues for the new thinking of knowledge utilization: Introductory remarks. *Knowledge and Policy*, *10*(3), 3–10. https://doi.org/10.1007/BF02912503

Olszewski, M. (2015). The determinants of knowledge transfer from universities to tourism companies–a conceptual model and research propositions. *European Journal of Service Management*, *16*(2), 111–118. https://doi.org/10.18276/smt.2015.16-11

Olszewski, M., & Bednarska, M. A. (2016, June 26–30). *Why don't tourism firms use academic knowledge for innovation? A conceptual framework* [Paper presentation]. EATSA Conference: A Pathway for the New Generation of Tourism Research, Portugal.

Ottoson, J. M. (2009). Knowledge-for-action theories in evaluation: Knowledge utilization, diffusion, implementation, transfer, and translation. *New Directions for Evaluation*, *2009*(124), 7–20. https://doi.org/10.1002/ev.310

Ouimet, M., Landry, R., Ziam, S., & Bédard, P. O. (2009). The absorption of research knowledge by public civil servants. *Evidence & Policy: A Journal of Research, Debate and Practice*, *5*(4), 331–350. https://doi.org/10.1332/174426409X478734

Pallant, J. (2016). *SPSS survival manual A step by step guide to data analysis using SPSS program* (6th ed.). McGraw-Hill Education.

Pyo, S. (2012). Identifying and prioritising destination knowledge needs. *Annals of Tourism Research*, *39*(2), 1156–1175. https://doi.org/10.1016/j.annals.2011.12.009

Reed, M. S., Stringer, L. C., Fazey, I., Evely, A. C., & Kruijsen, J. H. (2014). Five principles for the practice of knowledge exchange in environmental management. *Journal of Environmental Management*, *146*, 337–345. https://doi.org/10.1016/j.jenvman.2014.07.021

Rich, R. F. (1997). Measuring knowledge utilization: Processes and outcomes. *Knowledge and Policy*, *10*(3), 11–24. https://doi.org/10.1007/BF02912504

Ritchie, R. J., & Ritchie, J. B. (2002). A framework for an industry supported destination marketing information system. *Tourism Management*, *23*(5), 439–454. https://doi.org/10.1016/S0261-5177(02)00007-9

Rosenberg, N., & Nathan, R. (1982). *Inside the black box: Technology and economics*. Cambridge University Press.

Roux, D. J., Kingsford, R. T., Cook, C. N., Carruthers, J., Dickson, K., & Hockings, M. (2019). The case for embedding researchers in conservation agencies. *Conservation Biology*, *33*(6), 1266–1274. https://doi.org/10.1111/cobi.13324

Roux, D. J., Rogers, K. H., Biggs, H. C., Ashton, P. J., & Sergeant, A. (2006). Bridging the science-management divide moving from unidirectional knowledge transfer to knowledge interfacing and sharing. *Ecology and Society*, *11*(1).

Stone, M. (1979). Comments on model selection criteria of Akaike and Schwarz. *Journal of the Royal Statistical Society. Series B (Methodological)*, *41*(2), 276–278. https://doi.org/10.1111/j.2517-6161.1979.tb01084.x

Suhr, D. (2006, March 29). *Exploratory or confirmatory factor analysis?* [Paper presentation]. Thirty-first Annual SAS Users Group International Conference, Cary, NC, United States.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using Multivariate statistics* (5th ed.). Pearson Education.

Tanriverdi, H., & Venkatraman, N. (2005). Knowledge relatedness and the performance of multibusiness firms. *Strategic Management Journal*, *26*(2), 97–119. https://doi.org/10.1002/smj.435

Thomas, R. (2012). Business elites, universities and knowledge transfer in tourism. *Tourism Management*, *33*(3), 553–561. https://doi.org/10.1016/j.tourman.2011.06.009

Turner, S. (2013). *Absorptive capacity: The role of communities of practice*. Working Paper No.444. University of Cambridge.

van der Arend, J. (2014). Bridging the research/policy gap: Policy officials' perspectives on the barriers and facilitators to effective links between academic and policy worlds. *Policy Studies*, *35*(6), 611–630. https://doi.org/10.1080/01442872.2014.971731

Voorhees, C. M., Brady, M. K., Calantone, R., & Ramirez, E. (2016). Discriminant validity testing in marketing: An analysis, causes for concern, and proposed remedies. *Journal of the Academy of Marketing Science*, *44*(1), 119–134. https://doi.org/10.1007/s11747-015-0455-4

Wardell, M. J., & Moore, S. A. (2004). *Collection, storage and application of visitor use data in protected areas: Guiding principles and case studies*. CRC for Sustainable Tourism Pty.

Weaver, D. B., & Lawton, L. J. (2017). A new visitation paradigm for protected areas. *Tourism Management*, *60*, 140–146. https://doi.org/10.1016/j.tourman.2016.11.018 [Crossref],

Westland, J. C. (2010). Lower bounds on sample size in structural equation modeling. *Electronic Commerce Research and Applications*, *9*(6), 476–487. https://doi.org/10.1016/j.elerap.2010.07.003

Xiao, H., & Smith, S. L. J. (2007). The use of tourism knowledge: Research propositions. *Annals of Tourism Research*, *34*(2), 310–331. https://doi.org/10.1016/j.annals.2006.09.001

Yin, R. K., & Moore, G. B. (1988). Lessons on the utilization of research from nine case experiences in the natural hazards field. *Knowledge in Society*, *1*(3), 25–44. https://doi.org/10.1007/BF02736981

Zahra, S. A., & George, G. (2002). Absorptive capacity: A review. *Reconceptualisation, and Extension. The Academy of Management Review*, *27*(2), 185–203.

https://doi.org/10.5465/amr.2002.6587995

Appendix 1.: Measures of independent and dependent variables**.**

List of variables and its measurements		
Independent variable	KU	The index comprises six stages of utilisation assessed on a five point scale measuring frequency, ranging from 1 (never) to 5 (always): (Transmission) The results of the work have been transmitted to the practitioners and professionals concerned; (Cognition) the results have been read and understood by the practitioners and professionals concerned; (Reference) the results have been cited as a reference in the reports, studies and strategies of action elaborated by practitioners and professionals; (Effort) efforts were made by practitioners and professionals to adopt the results or recommendations of the work; (Influence) the results influenced the decisions of practitioners and professionals; (Application) the results gave rise to applications and extension by the practitioners and professionals concerned.
	ADAPT	This index is based on the researcher's perception of the importance of adaptation of research outputs for practitioners. It comprises seven items on a 6-point scale, ranging from 0 (not applicable), 1 (not important at all) to 5 (extremely important). The seven items are: (A1) Readability and ease of comprehension of reports or research articles; (A2) specific, operational nature of conclusions or recommendations; (A3) provision of data that can be analysed by end-users; (A4) sensitivity to end-users' expectations; (A5) presentation/packaging of reports (graphics, colour, packaging); (A6) on-time delivery of results to end-users and (A7) attention to deliverables
	CONTEXT	This index represents the perceptions (of the researcher) about numerous organisational circumstances in the particular PAs the researcher has worked in. It comprises six items on a six-point scale measuring frequency, ranging from My work is supported by a champion higher up in the PA agency or 0 (not applicable), 1 (never) to 5 (always). The six dimensions are the following: (C1) My work is supported by a champion higher up in the PA agency or government department; (C2) the PA agencies I work with exhibit a policy environment that encourages innovation, change and improvement in visitor services; (C3) funding is available to PAs for implementing the recommendations of my work; (C4) internal politics within PA agencies prevent the uptake of my visitor research or data; (C5) my work is relevant to local or regional policy decision-makers; (C6) I receive institutional support of my work at all levels
	DISSE	This index measured the perceived importance of dissemination efforts, consisting of four items on a six-point scale, ranging from 0 (not applicable), 1 (not important at all) to 5 (extremely important). The four items are: (D1) Preparing and conducting meetings in order to plan the subject and scope of projects with end-users; (D2) formal meetings to report on a study's progress or to discuss preliminary results with end-users; (D3) formal meetings to discuss findings with end-users; (D4) organising dissemination activities for end-users
	ENGAGE	This index represents the perceived level of engagement and alignment between PA practitioners and researchers. It comprises five items on a six-point scale, ranging from 0 (not applicable), 1 (strongly disagree) to 5 (strongly agree). The five items are: (E1) My work coincides with the needs and expectations of practitioners and professionals; (E2) practitioners and professionals attribute credibility to my work; (E3) my work is closely aligned with the objectives of the end-user organisation; (E4) practitioners clearly articulate their research or data needs to me; (E5) practitioners put my recommendations into action
	LINKA	This index measures the level of importance of linkage mechanisms between researchers and practitioners, as perceived by researchers. It consists of four items on a six-point scale, ranging from 0 (not applicable), 1 (not important at all) to 5 (extremely important). The four items include: (L1) Informal contacts with staff and professionals of protected areas; (L2) participation in committees, seminars and workshops with staff of protected areas; (L3) sending reports to protected area practitioners and professionals; (L4) publication of articles in popular media
	SCA	This index, consisting of only two items, represents the perceived level of skills, capacity and awareness of practitioners. The index measures frequency on a six-point scale, ranging from 0 (not applicable), 1 (never) to 5 (always). The items are: (S1) practitioners have the necessary skills and resources required to interpret and apply my research / data effectively; (S2) practitioners are aware of the importance of collecting data about visitors to inform management decisions
	TIMING	TIMING is a unidimensional index measuring a researcher's perception of whether his/her research outputs reached practitioners at just the right time. It thus consisted of a single item on a six-point scale, ranging from 0 (not applicable), 1 (strongly disagree) to 5 (strongly agree). The statement read: My results have reached users at just the right moment to be used

Appendix 2. Detailed description of scale development.

KU

An EFA using Principle Axis Factoring (PAF) of the six items that make up KU, produced satisfactory levels of both Kaiser-Meyer-Olkin (KMO) measure (0.848) and Bartlett's test result ($p < 0.001$). All six items had factor loadings larger than 0.6 and the six items combined into one factor with total variance explained (Extraction Sums of Squared Loadings) of 57.22%. This is an existing scale, used previously by other authors. As such, a CFA was performed, however the results obtained from the fit indices of $\chi 2$/df. = 8.558, CFI = 0.919, TLI = 0.865, and RMSEA = 0.174, were not sufficient for acceptable model fit. All standardised factor loadings were however above the threshold of 0.5. Internal consistency reliability was met as the Cronbrach's alpha values for all individual items and the scale as a whole, were well above 0.6. The results indicate the scale was both reliable and valid.

The following constructs represented the independent variables in the measurement model.

ADAPT

Although the results of an EFA using PAF yielded an adequate Kaiser-Meyer-Olkin (KMO) measure (0.798) and Bartlett's test result ($p < 0.001$), two factor loadings (items A2 and A3) were low (.417 and .368, respectively) and the total variance explained (Extraction Sums of Squared Loadings) 31.265%. These items were removed from the scale and a subsequent EFA performed. The results showed a satisfactory KMO (0.778) and Bartlett's test result ($p < 0.001$), this time with four out of five items' factor loadings above the threshold of 0.5. Item A1 had a factor loading of 0.469, just slightly below the recommended threshold. A decision was made to retain A1 as the five items combined into one factor and the Cronbach's alpha values for all items and for the scale was above 0.6, which together with the results of the EFA, indicates the scale was both reliable and valid. Total variance explained (Extraction Sums of Squared Loadings) was 37.96%. Pearson's r between ADAPT and KU indicated a weak positive relationship.

CONTEXT

An EFA including the six initial items (C1-C6) was unsuccessful. Items C4 and C5 formed a factor on their own but with very low Cronbach α (0.3). On closer inspection, C4 was negatively rated in the scale. It was reverse scored, but the Cronbach α value was still too low. C5, also did not belong to the organisational context of a PA, but rather to the extended environment in which PAs operate. The authors decided to remove C4 and C5 and continue with one factor. The EFA of the final version of CONTEXT (C1–C3, C6) revealed an adequate KMO of 0.712 and a Bartlett's test result of $p < 0.001$, with all factor loadings equal to or larger than 0.5. Construct validity was therefore met. The correlation coefficient between the reduced-item CONTEXT and KU showed a moderate positive relationship (Pearson's $r = 0.462$). The scale was also deemed reliable as the individual and scale-level Cronbach's alpha values were above 0.5.

DISSE

The correlation coefficient between DISSE and KU showed a weak positive relationship (Pearson's $r = 0.211$). An EFA using PAF was performed, the results of which produced a satisfactory level of the KMO (0.720) and Bartlett's test result ($p < 0.001$) and all factor loadings were larger than 0.5. The four items created one factor with total variance explained (Extraction Sums of Squared Loadings) of 44.42%. This is an existing scale, used previously by other authors. A CFA was performed, however, the results obtained from the fit indices of $\chi 2$/df = 4.648, CFI = 0.969, TLI=0.97, and RMSEA=0.121, was not sufficient for acceptable model fit. All standardised factor loadings were however above the threshold of 0.5. The Cronbach's alpha values of individual items and the scale was above 0.6, which together with the results of the EFA, indicates the scale was both reliable and valid.

ENGAGE

The correlation coefficient between ENGAGE and KU revealed a moderate to strong positive relationship (Pearson's $r = 0.624$). The EFA using PAF was satisfactory with a KMO of 0.715 and Bartlett's test result of $p < 0.01$. All four items' factor loadings exceeded the 0.5 cut-off level. In addition, the four items converged into one factor, indicating that the scale was valid. Total variance explained was 37.17%. The Cronbach's alpha value of all individual items and of the scale were all above 0.5, therefore the scale was also deemed reliable.

LINKA

Results of the EFA using PAF yielded a satisfactory KMO (0.648) and Bartlett's test result ($p < 0.01$). Two items' factor loadings were however below the minimum acceptable level of 0.5 (L1 = 0.342; L2 = 0.490). The correlation coefficient between KU and LINKA also revealed a negligible relationship between the variables (Pearson's $r = 0.127$). The Cronbach's alpha value of items L3 and L4 were both below 0.5 (0.474 and 0.465, respectively). Based on these findings, LINKA was excluded from the measurement model as it was neither valid nor reliable.

SCA

The EFA results of SCA was satisfactory with a KMO of 0.5 and a Bartlett's test result of $p < 0.01$. Both items' factor loadings exceeded 0.6. The total variance explained by the two items (Extraction Sums of Squared Loadings) equalled 43.594%. To test the scale's reliability, the Guttman Split-Half Coefficient was calculated. It reached a level of 0.608, above the 0.6 threshold. The scale was therefore both valid and reliable.

TIMING

TIMING consisted of a single item and showed a moderate positive relationship with KU (Pearson's $r = 0.462$). Since this variable consisted of only one item, validity and reliability could not be established.