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School of Sport, Tourism and Hospitality Management

Meta Analysis in Tourism and Hospitality Management
旅游管理元分析理论与实践

Prof. Yang Yang

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About me

- Professor and Chair at STHM, Temple University
- PhD in Geography, University of Florida
- MA in Econ and M.Stat, University of Florida
- M.Phil in Hotel and Tourism Management, Hong Kong PolyU
- PostGraduate Dip. In Human Geography, Peking University
- BSc in Geography, Nanjing University

- Associate Editor, Annals of Tourism Research
- Coordinate Editor, International Journal of Hospitality Management

CONTENTS

Background

Empirical Analyses and their Variations

- Understanding the Sources of Differences in Results Due to Diverse Datasets, Methods, and Contexts

Synthesizing Existing Syntheses

- A Critical Review of Meta-Analyses in Tourism and Hospitality Discourse

Identifying Patterns and Trends

- Analyzing the Common Threads and Developments in Tourism and Hospitality Relationships

Addressing the Implications of Discrepancies

- Discussing the Practical Consequences of Divergent Findings for Industry Practice and Policy
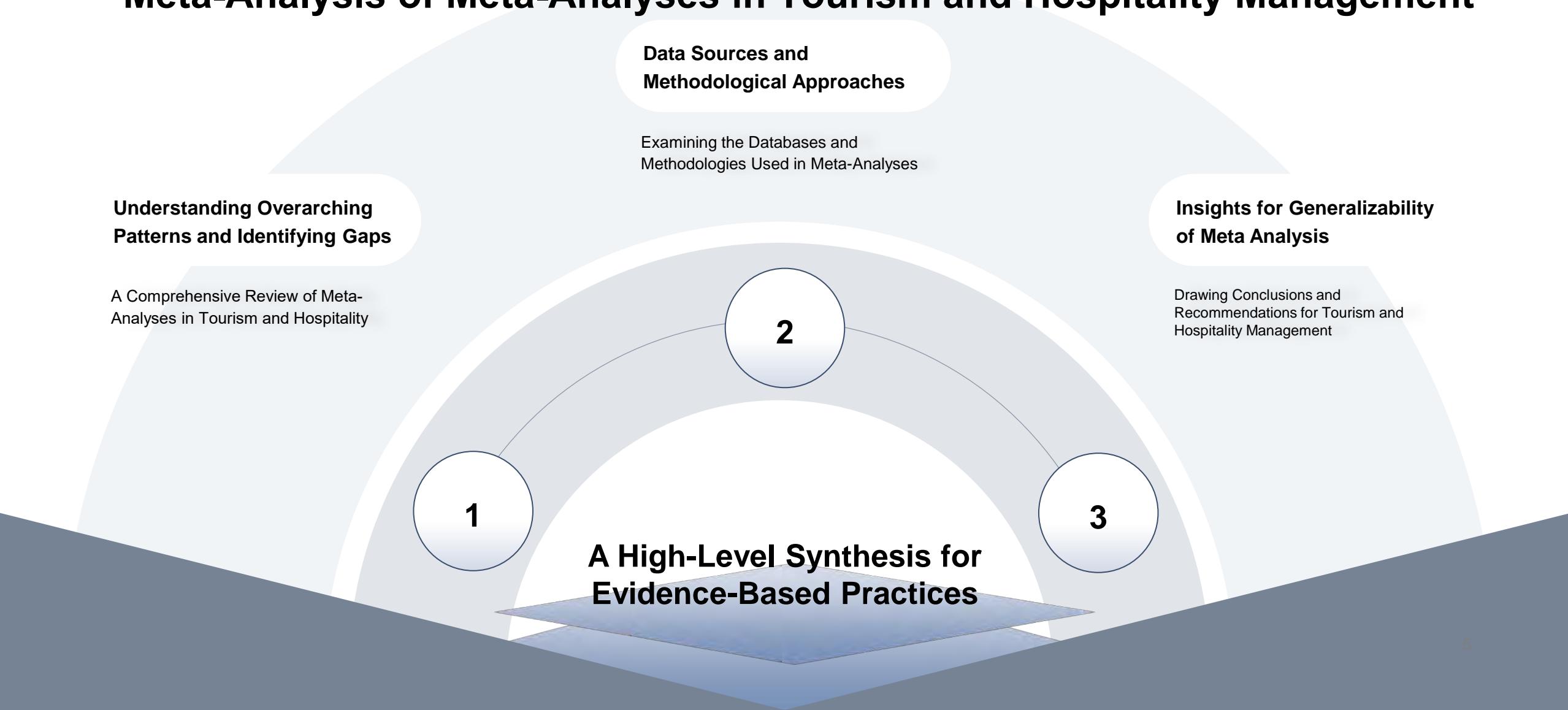
Background

- Meta-analysis is the statistical analysis of a large collection of (statistical) results from individual studies for the integrating the findings.

- Meta-analysis offers new opportunities for integrating and combining the contradictory outcomes dies and for analyzing variance in effect sizes across

APPENDIX A1: Summary of meta-analyses published in marketing by type of journal and by theme

Themes	Rank A journals*				
	JCR^a	JM	JMR	MKS	Total
Methodology	3		3		6
Consumer	4			1	5
Marketing strategy		5	1		6
Price/Promotion			3	1	4
Product/Service		1	4	1	6
Communication	2	2	5		9
Distribution and sales force			4		4
TOTAL	9	8	20	3	40

[a] JCR: Journal of Consumer Research; JM: Journal of Marketing; JMR: Journal of Marketing Research; MKS: Marketing Science

Source: Laroche and Soulez (2012)

- Meta-analysis has the advantage of reducing the arbitrary elements of traditional narrative reviews to a strict minimum through a systematic and **reproducible** methodology
  - another researcher with access to the same data can replicate it and arrive at the same conclusions (Fournier and Vauquois-Mathevet, 1999).

- Meta-analysis helps extend the theory by contextualization.

- The possibility of summarizing a set of empirical results, particularly when they are contradictory, can explain the growing interest in meta-analysis.

Background

- Meta-analysis is a statistical approach to combine the results from multiple studies to
  - increase statistical power
  - improve estimates of effect size
  - resolve uncertainty when reports disagree
  - unveil factors explaining the heterogeneity

R. 3

R. 2

R. 1
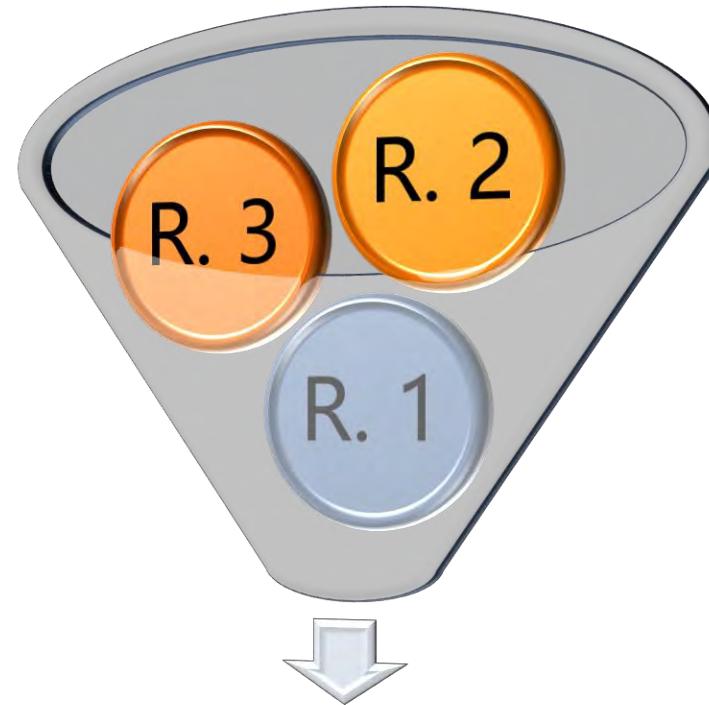
More comprehensive result

Logics of meta-analysis

- Traditional methods of review focus on statistical significance testing to decide "whether or not" there is an effect

- Significance testing is not well suited to this task
  - highly dependent on sample size
  - most errors are Type II errors
  - question of comparability of studies of "same study"

- Meta-analysis changes the focus to the direction and magnitude of the effects across studies

What can meta-analysis do?

- Combining these effect size
  - What is the 'true' effect of place attachment on satisfaction?
  - What is the 'true' path coefficient of model of theory of planned behavior in tourism?

- Assessing the heterogeneity of the effect sizes in each study
  - Which type of data (first-hand vs. secondary) is more likely to obtain significant results?
  - Does cultural difference explain the different results from different studies?
  - Detect 'publication bias'

Meta-analysis in THM

Article

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Meta-A

Claudia Nis

Abstract
Unsustainable p
behavioral strat
This article aim
sustainable hote
2016. Papers d
The final sample

Tourism Management 45 (2014) 181–193

Contents lists available at ScienceDirect

Tourism Management

Research Article

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Bo Peng [a], Ha

[a] Cass Business School
[b] School of Hotel and
[c] Department of Mark

Sara Dolnic

HIGHLIGH

- The relationship
- The results show
- The findings prov

Tourism Management 67 (2018) 248–260

Contents lists available at ScienceDirect

Tourism Management

journal homepage: www.elsevier.com/locate/tourman

Electronic word of mouth and hotel performance: A meta-analysis

Yang Yang [a], Sangwon Park [b, *], Xingbao Hu [a]

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[b] School of Hotel and Tourism Management, The Hong Kong Polytechnic University, 619, 17 Science Museum Road, TST East, Kowloon, Hong Kong

HIGHLIGHTS

Abstract
Explaining huma
satisfied tourist:
work, arriving a
the link betwee

- eWOM valence-based elasticity is twice as large as eWOM volume-based elasticity.
- The elasticity is significantly lower in low-end hotels.
- The elasticity is significantly lower in hotels in China.
- The elasticity is significantly higher across reviews posted on TripAdvisor.
- The elasticity is significantly lower when using panel data.

Steps

• Conducting a meta-analysis means following a specific procedure:

- • Stage 1: Formulating a research question
- • Stage 2: Gathering studies
- • Stage 3: Selecting studies
- • Stage 4: Gathering data and coding the selected studies
- • Stage 5: Analyzing the data
- • Stage 6: Presenting and interpreting the results

Effect size

- How to code the data from different studies is very important.

- A common metric should be selected, and that is "effect size":
  - the numerical outcome to be analyzed in a meta-analysis; a summary statistic of the data in each study included in the meta-analysis.

Table 3.1 Roadmap of formulas in subsequent chapters.

Effect sizes based on means (Chapter 4)
   Raw (unstandardized) mean difference (D)
      Based on studies with independent groups
      Based on studies with matched groups or pre-post designs
   Standardized mean difference (d or g)
      Based on studies with independent groups
      Based on studies with matched groups or pre-post designs
   Response ratios (R)
      Based on studies with independent groups
Effect sizes based on binary data (Chapter 5)
   Risk ratio (RR)
      Based on studies with independent groups
   Odds ratio (OR)
      Based on studies with independent groups
   Risk difference (RD)
      Based on studies with independent groups
Effect sizes based on correlational data (Chapter 6)
   Correlation (r)
      Based on studies with one group

Source: Borenstein, Hedges, Higgins and Rothstein (2009)

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Further ideas about effect size

- P-value traps: Over simplification of using p-value as an exclusive evidence.

- Recent discussing on using alternative measures:
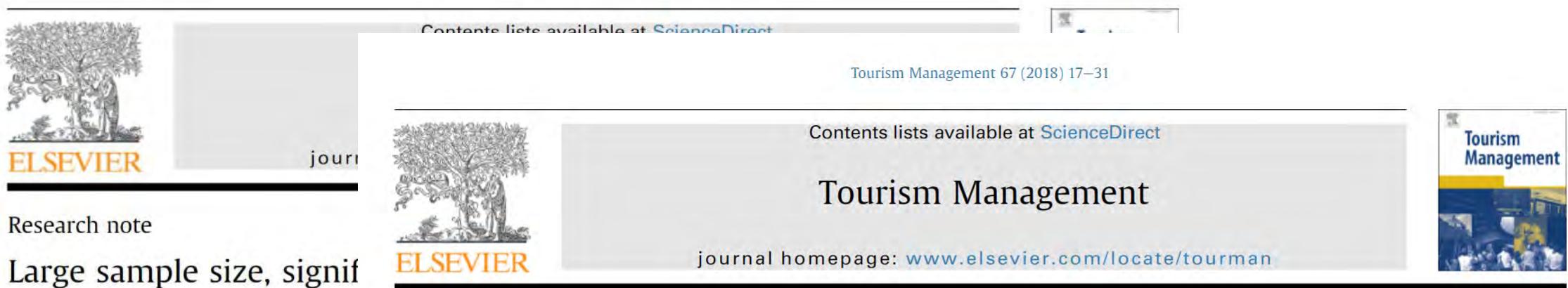
ELSEVIER

Research note

Large sample size, signif[...] perils of using big data [...]

Jalayer Khalilzadeh[*], Asli D.A. T[...]

Tourism Management 67 (2018) 17–31

Contents lists available at ScienceDirect

Tourism Management

ELSEVIER

journal homepage: www.elsevier.com/locate/tourman

Bayes factors vs. P-values

A. George Assaf [a, *, 1], Mike Tsionas [b, c, 1]

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b Lancaster University Management School, LA1 4YX, UK
c Athens University of Economics and Business, Greece

Further ideas about effect size

- Alternative 'effect sizes' (Khalilzadeh and Tasci, 2017)

  - Cramer v for chi-square
  - Etta square for ANOVA
  - R-square and beta coefficients for regression
  - Pearson/ Spearman rho for correlation
  - Odds ratio for logit/logistic models
  - t-test (use ANOVA with Etta square instead)

2. Meta-analysis for regression/econometrics

Yang, Y., Xue, L., & Jones, T. E. (2019). Tourism-enhancing effect of World Heritage Sites: Panacea or placebo? A meta-analysis. *Annals of Tourism Research*, *75*, 29-41.

Background

- World heritage list was first founded by UNESCO in 1972

- A WHS is a landmark or area having cultural, historical, scientific or other form of significance, and is legally protected by international treaties.

- The sites are judged important to the collective interests of humanity."

United Nations Educational, Scientific and Cultural Organization

- World
- Heritage
- Convention

Background

As of July 2017, 1073 sites are listed: 832 cultural, 206 natural, and 35 mixed properties, in 167 states.

Background

- Inscription on the list is portrayed as a reliable means of increasing visitor numbers (Shackley, 2006)

  - "top brand" that confers a competitive advantage (Buckley, 2004)

  - "magnet for visitors" (Fyall & Rakic, 2006)

- Prioritize tourism by government and society
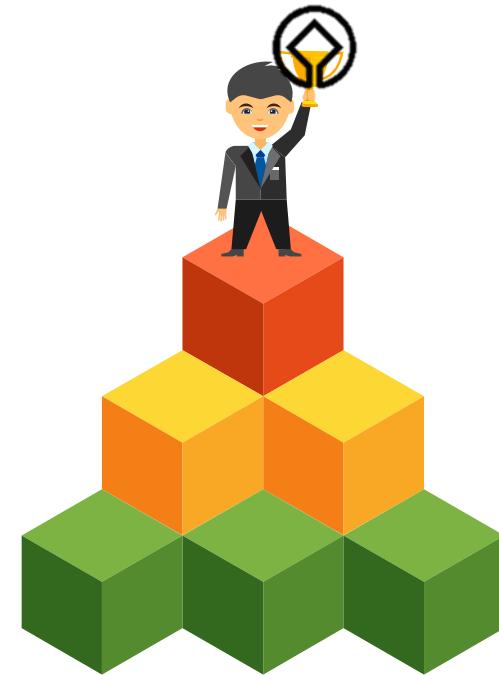
Background

- Existing studies diverge considerably over the finer details of the relationship between WHS status and tourism demand

Positive and significant effect

e.g., Buckley (2002)
Yang & Lin (2014)
Su & Lin (2014)

Insignificant effect

e.g., Cellini (2011)
Huang et al (2012)
Chen & Haynes (2012)

Negative and significant effect

e.g., Poprawe (2015)
Ishii (2012)
Cuccia, Guccio, & Rizzo (2016)

Background

- Research Aim

  - Synthesize the overall effects of WHS on tourism demand, and explore moderators on the relationship.

  - Using meta-analysis based on an "augmented" data set from past empirical studies.

Research Framework

Research setting
Research period
Development level
Unit of analysis
Tourist type
WHS type

Context

Data structure
Dyadic type
Longitudinal type

Variable operation
Demand measurement
WHS measurement

Model estimation
Robust standard error

Model specification
Functional form

Methodology

Publication outlet
Journal type

Outlet
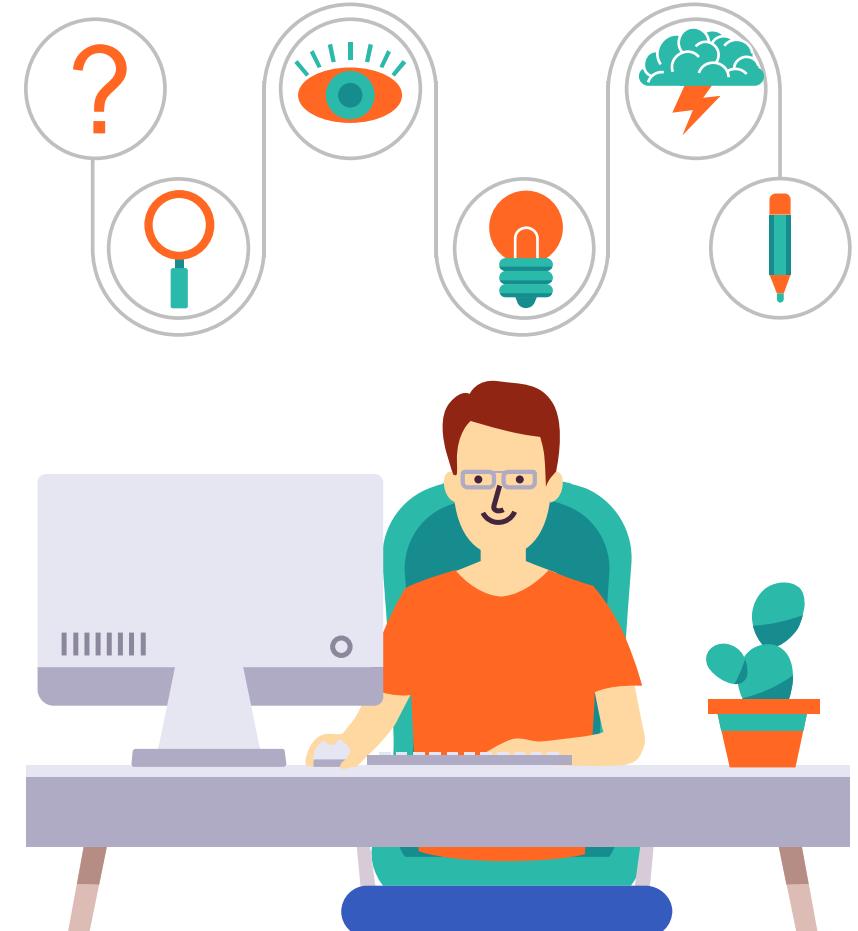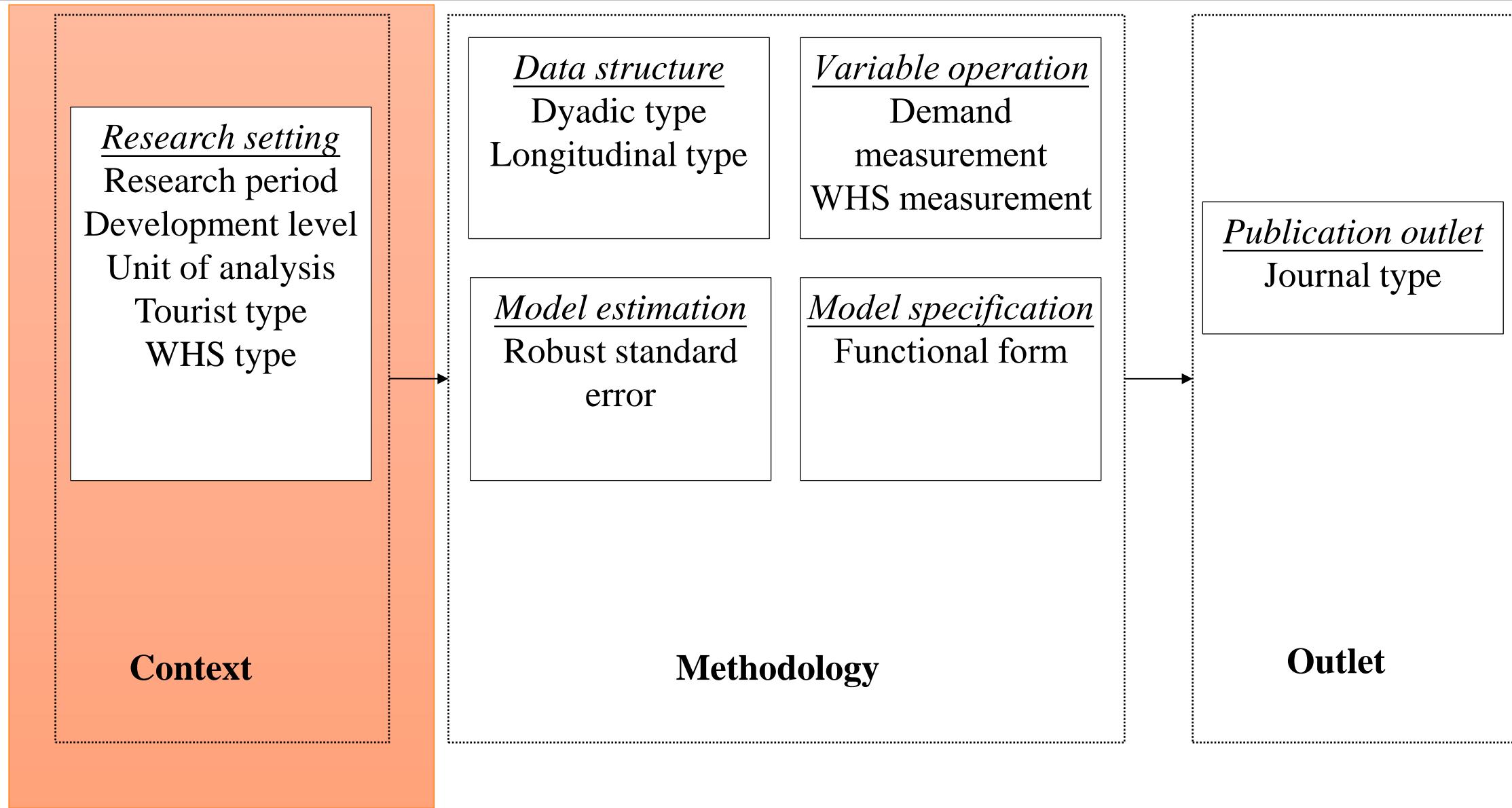
Research Framework

- Research period

Ribaudo, & Figini, 2016; Su, & Lin, 2014; UNESCO, 2018
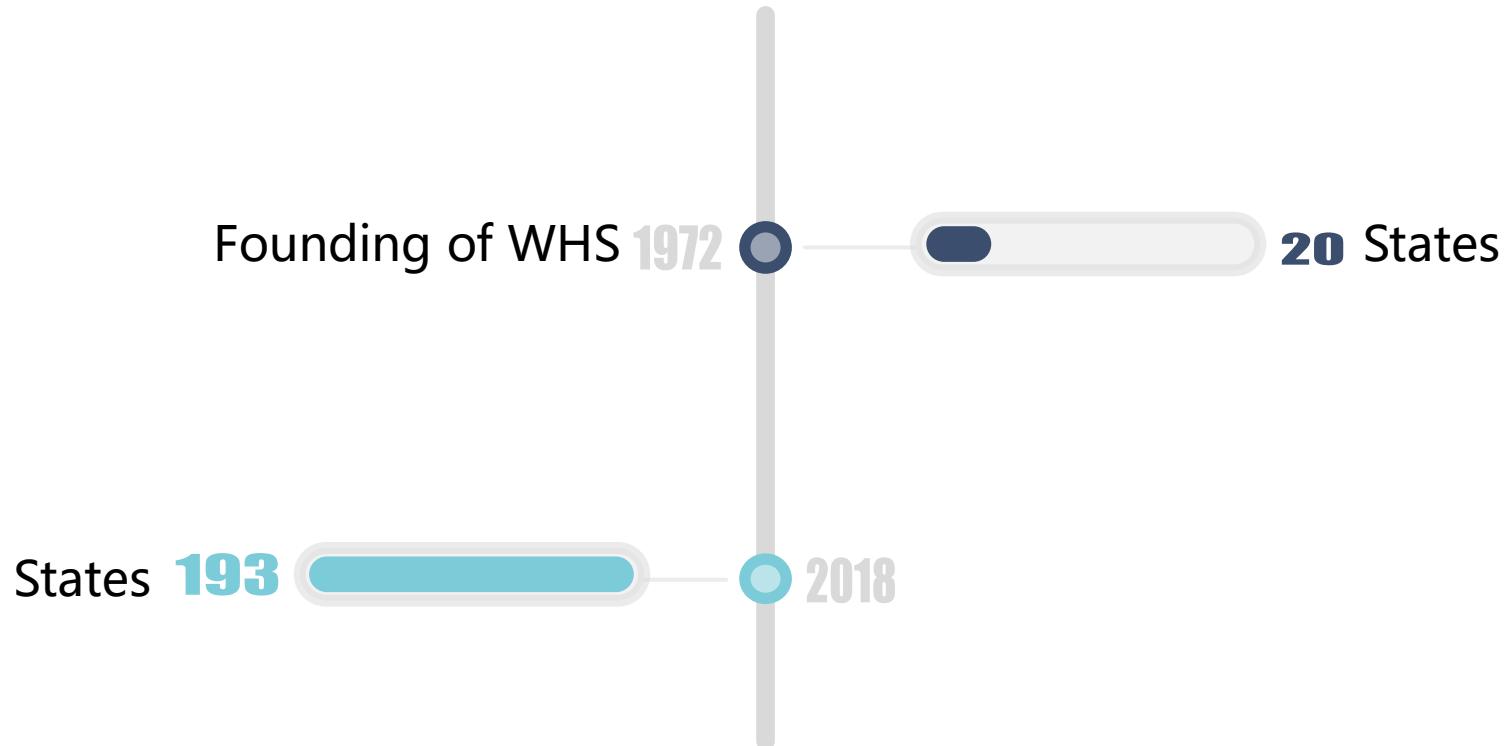
Research Framework

- Development level

VS

Developing destinations

Developed destinations

- Authorities in developing countries are more likely to promote the labelling of WHS

Ryan, & Gu, 2009; King & Halpenny, 2014; Marcotte & Bourdeau, 2012

Research Framework

- Unit of analysis

Country

Region

City/Town

Site

small

Effect size

LARGE

Cuccia, 2012, Ribaudo & Figini, 2017
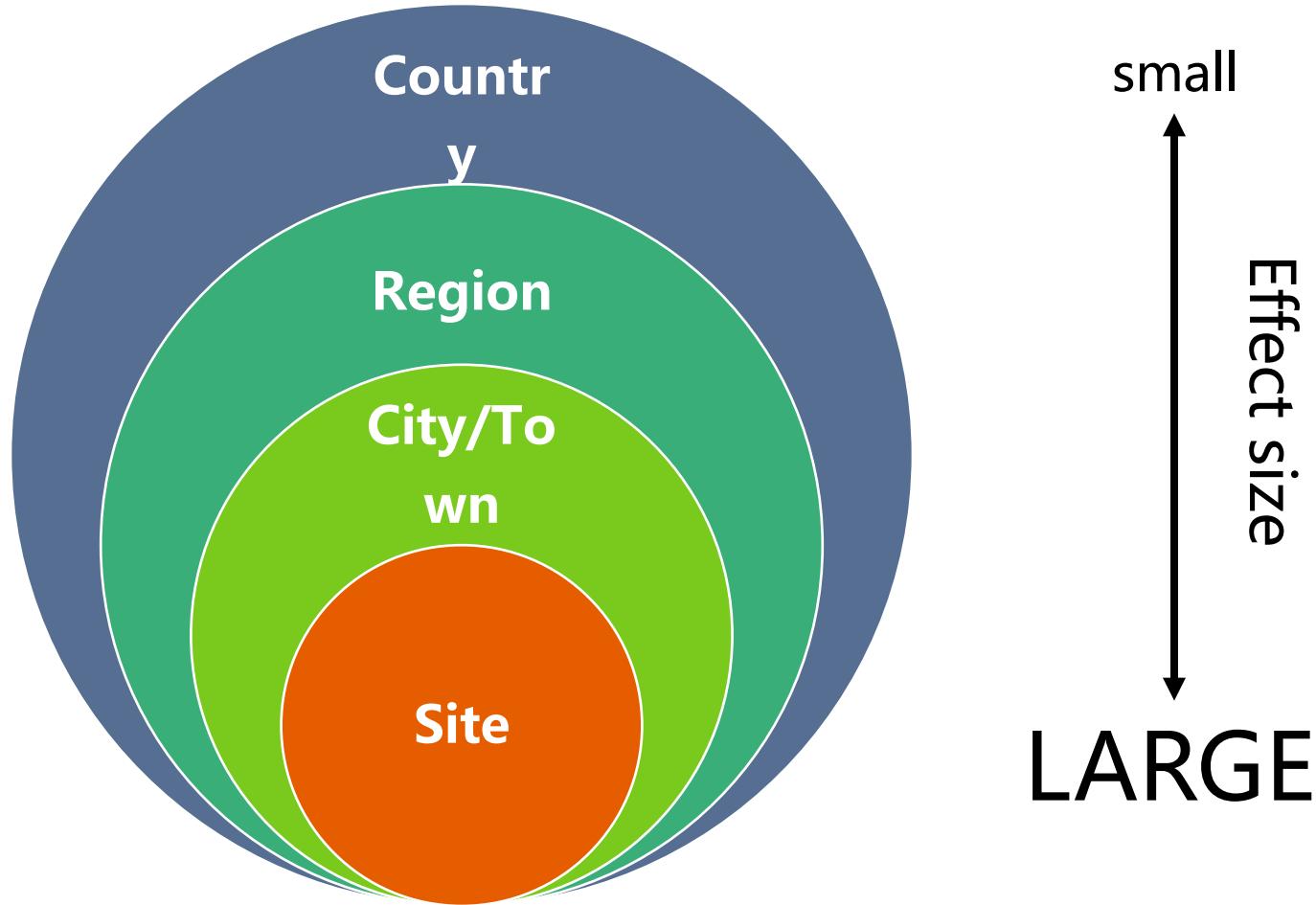
Research Framework

- Heritage type

VS

Cultural   Natural

- Cultural ones can be appreciated worldwide after inscription.

Cuccia , 2012; Park, & Jang, 2014; Su and Lin , 2014; Yang, Lin, and Han, 2014

Research Framework

Research setting
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WHS type

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Demand
measurement
WHS measurement

Model estimation
Robust standard
error

Model specification
Functional form

Methodology

Publication outlet
Journal type

Outlet

Methods

- Databases：Google Scholar, EBSCO Hospitality & Tourism Complete, and ProQuest Dissertation

- Keywords：world heritage, tourism, tourist, regression, gravity model, etc.

- Data collection: Oct, 2017

- Screening criteria:

    Tourism demand (arrival/expenditure/night) as dependent variable

    World heritage site number or status as independent variable

    English only

- Papers collected：43 (journal articles, theses, working papers, and chapters)

- Total number of effect sizes: 343 (partial correlation coefficients from reg.)

Methods

Coding template → Pilot coding → Template revision → Independent coding → Cross-check
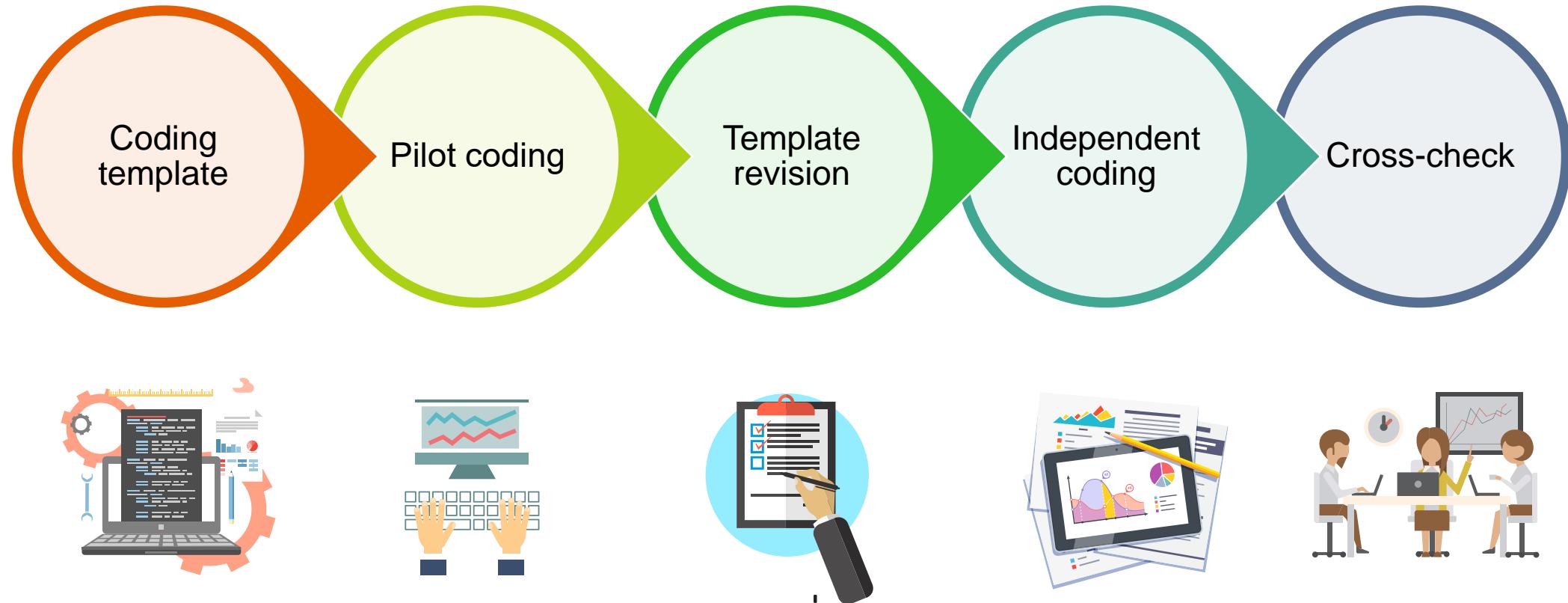
Methods

- Meta-regression

$$r_{ij} = \beta_1 + \sum \beta_k Z_{ki} + \beta_0 SE_{ij} + \varepsilon_{ij}$$

where *r* is the partial correlation coefficient, *Z* is a set of *K* explanatory variables, and *SE* is the standard error of partial correlation coefficient *r*. In the model, *i* index the estimate, which is nested in study *j*.

- Estimation: weighted least square with cluster robust standard error. (Random-effect and GEE estimation for robust check)

Arezki, Cherif, and Piotrowski (2009)
Arfa, et.al. (2016)
Baimai and Daniel (2009)
Bigano, Hamilton, and Tol (2006)
Cafiso, Cellini, and Cuccia (2018)
Campa, Lopez-Lambas, and Guirao (2016)
Cellini (2011)
Cellini and Torrisi (2013)
Chen and Haynes (2012)
Cho (2010)
Culiuc (2014)
Falk and Hagsten (2017)
Freytag and Vietze (2013)
Hamilton (2004)
Huang, Tsaur, and Yang (2012)
Ishii (2012)
Kayahan and Vanblarcom (2012)
Lawson and Roychoudhury (2016)
Li and Yang (2017)
Merza (2016)
Onofri and Nunes (2013)
Parida, Bhardwaj, and Chowdhury (2017)
Parida, Bhardwaj, and Chowdhury (2018)
Park and Jang (2014)
Patuelli, Mussoni, and Candela (2013)
Patuelli, Mussoni, and Candela (2014)
Poprawe (2015)
Priego, Rossello, and Santana-Gallego (2015)
Quintiliani (2009)
Roh, Bak, and Min (2015)
Romao, Guerreiro, and Rodrigues (2017)
Rossello, Santana-Gallego, and Awan (2017)
Saha and Yap (2014)
Saha and Yap (2015)
Su and Lin (2014)
Tsukai, Okumura, and Kuwano (2010)
VanBlarcom and Kayahan (2011)
Yang and Lin (2014)
Yang and Wong (2012)
Yang, Li, and Li (2017)
Yang, Lin, and Han (2010)
Yang, Liu, and Li (2018)
Yap and Saha (2013)

Effect size
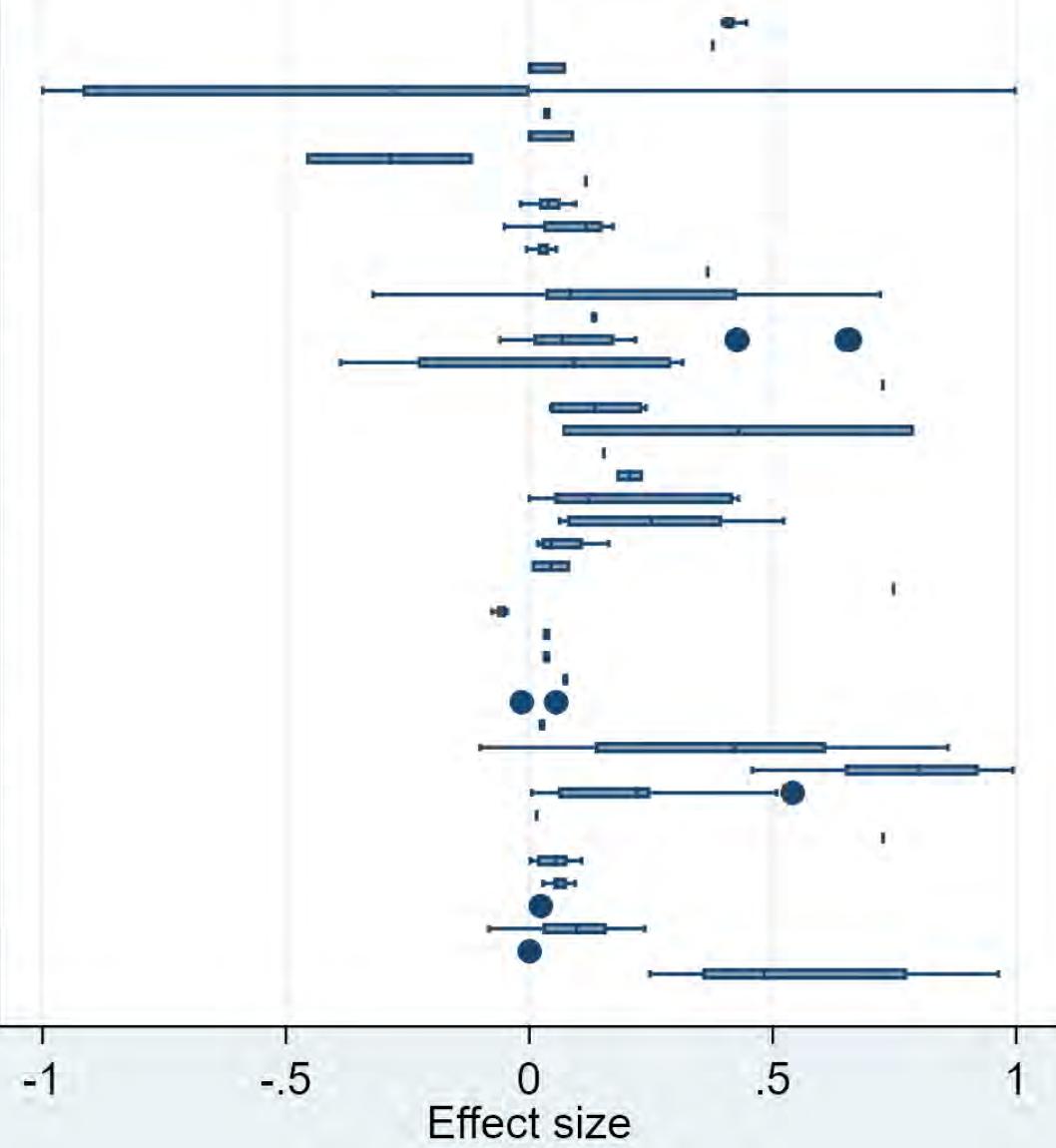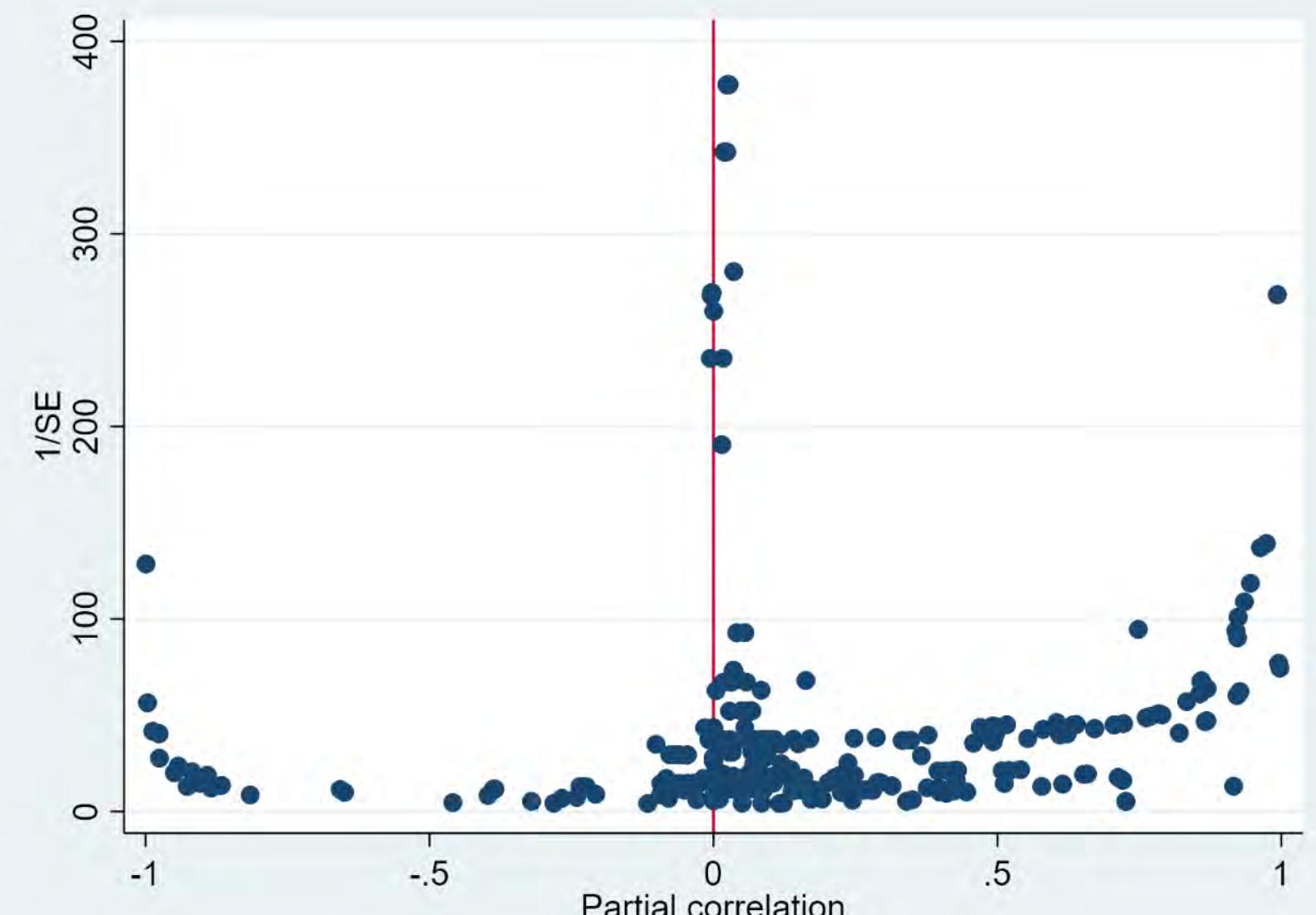
Methods

Variable	Definition
mid_year	Middle year of research period
developing	An indicator if all destinations are located in developing countries
country _unit	An indicator if the research unit is country-level
WHS_type	WHS types are considered, 1=all, 2=cultural, 3=natural
dyadic	An indicator if the data cover multiple destinations and/or origins
longitudinal	An indicator if the data cover longitudinal information
DV _arrival	If the dependent variable is measured by tourist arrivals
WHS_dummy	An indicator if a dummy variable is used to measure WHS
robust _error	An indicator if the robust standard errors are estimated
DV_log	An indicator if dependent variable is log-transformed
journal	An indicator if the work is published in a peer-review journal

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	WLS-all	WLS-all	WLS-Developing countries	WLS-Developed countries	WLS-Cultural WHS	WLS-Natural WHS
SE	5.570	0.763	-3.091**	-1.273	-6.041**	-4.208
	(3.730)	(1.022)	(1.328)	(1.908)	(2.676)	(5.254)
mid_year		0.0138*	0.0264***	-0.0614	0.131**	0.0352
		(0.008)	(0.008)	(0.058)	(0.058)	(0.077)
developing		0.115***			0.0603**	0.228***
		(0.037)			(0.023)	(0.039)
country_unit		-0.139	0.387***	-0.119	0.0857	0.0479
		(0.106)	(0.070)	(0.109)	(0.152)	(0.117)
domestic		0.0694	-0.0811	0.156		
		(0.086)	(0.050)	(0.163)		
cultural_WHS		0.476***	0.109**	0.156		
		(0.088)	(0.035)	(0.116)		
natural_WHS		0.156**	-0.0282			
		(0.075)	(0.027)			
dyadic		-0.111**				
		(0.054)				
longitudinal		0.0417				
		(0.045)				
DV_arrival		0.0769	-0.0582***	-0.0420	0.185*	0.230***
		(0.070)	(0.016)	(0.053)	(0.093)	(0.041)
WHS_dummy		0.196**	0.375***	-0.238	0.407**	0.471***
		(0.083)	(0.047)	(0.178)	(0.143)	(0.116)
robust_error		0.280**				
		(0.107)				
DV_log		-0.0865				
		(0.067)				
journal_article		0.0744				
		(0.058)				

- Results of jackknife sensitive analysis of meta-regression

	Median	Minimum	Maximum	Number of significant estimates (p<0.05)
SE	0.779	-0.474	1.551	0
mid_year	0.0138	0.00829	0.0223	1
developing	0.115	0.0505	0.150	42
country_unit	-0.139	-0.174	-0.0295	0
domestic	0.0687	-0.0158	0.125	0
cultural_WHS	0.476	0.411	0.533	43
natural_WHS	0.156	0.0866	0.210	33
dyadic	-0.111	-0.170	-0.077	30
longitudinal	0.0417	0.0228	0.0811	0
DV_arrival	0.0781	0.017	0.0926	0
WHS_dummy	0.196	0.143	0.260	39
robust_error	0.281	0.156	0.306	42
DV_log	-0.0865	-0.168	0.0273	2
journal_article	0.0742	-0.174	0.134	0
constant	-27.77	-44.77	-16.670	1
N (effect sizes)	339	304	343	
N (studies)	42	42	42	
Adj. R^2	0.842	0.467	0.941	
AIC	-468.4	-760.5	-292.9	
BIC	-411.0	-704.7	-235.8	

Context

Research setting
Research period
Development level
Unit of analysis
Tourist type
WHS type

Methodology

Data structure
Dyadic type
Longitudinal type

Variable operation
Demand measurement
WHS measurement

Model estimation
Robust standard error

Model specification
Functional form

Outlet

Publication outlet
Journal type
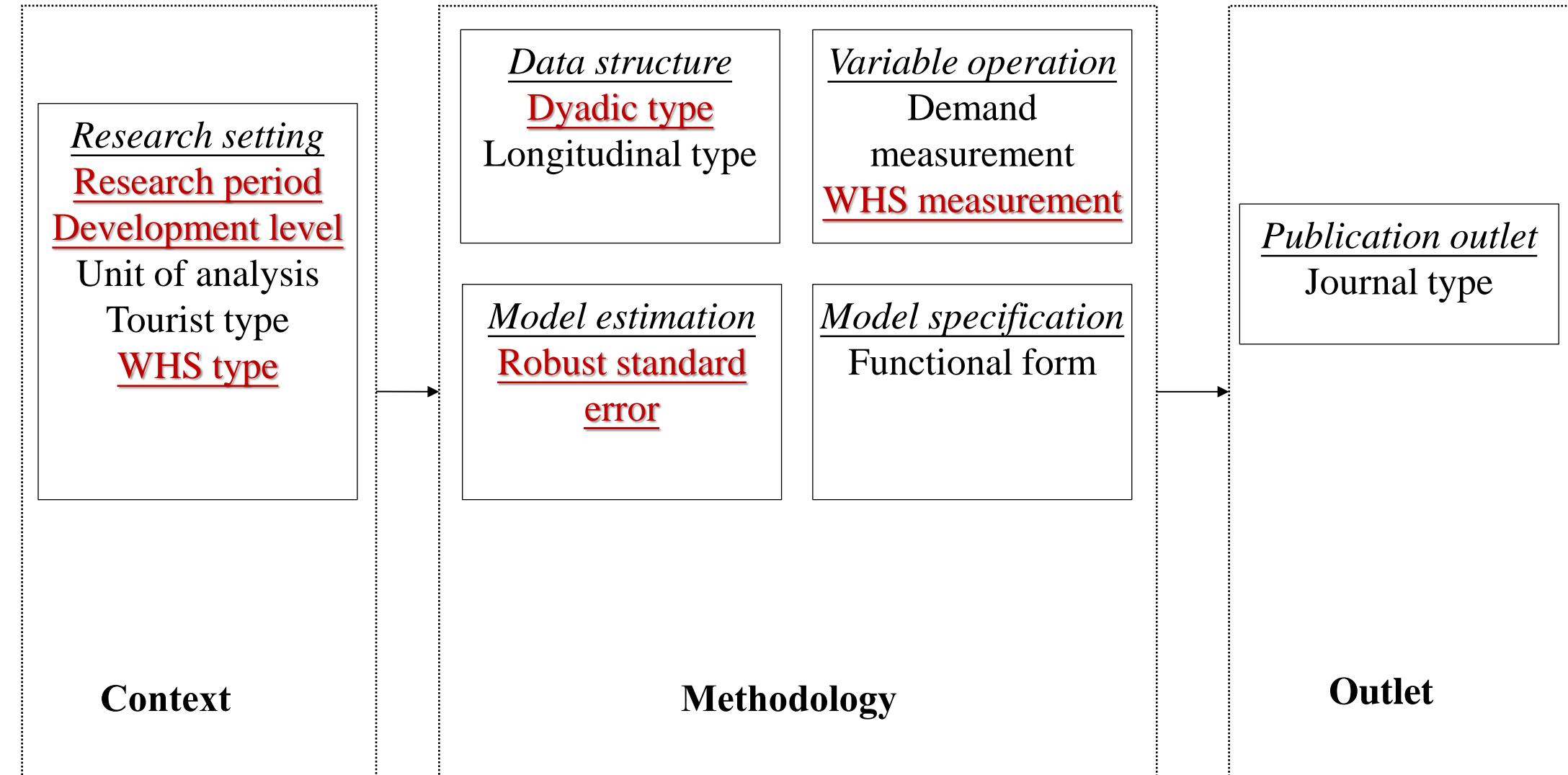
Conclusion

- The positive effect of WHS on tourism demand is larger in developing countries, and it increases over time. Overall, cultural sites brings a larger impact.

- The estimates of WHS are smaller with a dyadic data set.

- Robust standard errors are necessary to use.

- There are decreasing returns to scale from increasing the number of WHS.

Conclusion

- Although it is no panacea, the WHS effect is more pronounced in certain contexts such as in developing countries, where government agencies may realize quicker returns on investment efforts that support new applications for WHS status.

- Our results also provide methodological suggestions for future empirical research efforts on the tourism-enhancing effect of WHS listing as well as for tourism demand studies in general.

Contents lists available at ScienceDirect

Tourism Management

Cure-all or curse? A meta-regression on the effect of tourism development on poverty alleviation

Dapeng Zhang [a], Qiaoqiao Wang [a], Yang Yang [b, *]

[a] Department of Tourism Management, School of Business Administration, Zhongnan University of Economics and Law, China
[b] Department of Tourism and Hospitality Management, Temple University, Philadelphia, PA, USA

ARTICLE INFO

ABSTRACT

The purpose of this study is to synthesize the overall effect size of tourism on poverty alleviation and to unveil underlying factors explaining the heterogeneity of this effect size across estimates. Using a rigorous meta-analysis based on 298 estimates extracted from 33 studies, we calibrate a combined effect size of −0.14 with a 95% confidence interval of [-0.23, −0.05], indicating that tourism moderately reduces poverty. A meta-regression demonstrates that the effect size of the tourism–poverty nexus is susceptible to several factors, such as poverty and tourism measures, focal countries' development level, and endogeneity treatment. In particular, the results show that use of the Gini coefficient, a popular proxy for the poverty gap, can unexpectedly underestimate the negative effect size. Moreover, funnel plot and Galbraith plot demonstrate that researchers are apt to report a positive tourism–poverty nexus in the literature. Lastly, research and policy implications are provided.

1. Introduction

however, results remain largely inconclusive. Some scholars have

Competitors or Complements: A Meta-analysis of the Effect of Airbnb on Hotel Performance
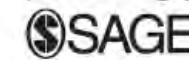
Yang Yang[1], Marta Nieto García[2], Giampaolo Viglia[2,3] (iD),
and Juan Luis Nicolau[4] (iD)

Abstract
The rise of peer-to-peer accommodation has challenged the traditional hotel business model. A lingering question is the effect of Airbnb supply on hotel performance. By analyzing 466 estimates from 33 different studies, our results reveal that the negative effect of Airbnb supply on hotel performance is moderate. The meta-regression of effect size recognizes the significant effects of different factors on the strength of the negative effect. In particular, the negative effect is smaller for high-end (vs. low-end) hotels, and its magnitude is shrinking over time. Additionally, the detrimental effect is less pronounced for European (vs. Asian) hotels. The study also reports that negative effects are more common in research published in academic journals. The synthesis of the effects across existing studies contributes to a robust and comprehensive understanding of the impact of Airbnb supply on hotel performance.

ELSEVIER

Electronic word of mouth and hotel performance: A meta-analysis

Yang Yang [a], Sangwon Park [b,*], Xingbao Hu [a]

[a] *Department of Tourism and Hospitality Management, Temple University, 1810 N.13th Street, Philadelphia, PA 19122, USA*
[b] *School of Hotel and Tourism Management, The Hong Kong Polytechnic University, 619, 17 Science Museum Road, TST East, Kowloon, Hong Kong*

HIGHLIGHTS

- eWOM valence-based elasticity is twice as large as eWOM volume-based elasticity.
- The elasticity is significantly lower in low-end hotels.
- The elasticity is significantly lower in hotels in China.
- The elasticity is significantly higher across reviews posted on TripAdvisor.
- The elasticity is significantly lower when using panel data.

ARTICLE INFO

ABSTRACT

This study synthesizes existing empirical results about the relationship between electronic word of mouth (eWOM) and hotel performance via meta-analysis. Based on estimates from 25 articles, the average eWOM valence-based elasticity is estimated to be 0.888, whereas the average volume-based elasticity is 0.055. A hierarchical linear model is applied to uncover five aspects that explain variations in eWOM elasticities: research setting, data structure, variable measurement, model specification, and research outlet. The estimation results highlight several significant aspects affecting elasticity, such as year of study, geographic setting, panel data structure, data frequency, performance measurement, control of price variable, and function form. Finally, implications are provided for researchers and hoteliers.
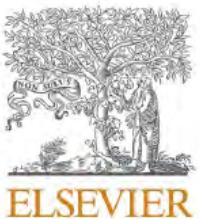
3. Meta-analysis for SEM
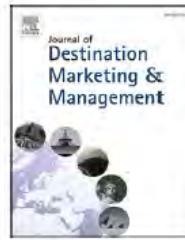
Optimal-fit model of risk perception and travel-related behaviors during a global pandemic

Bingjie Liu-Lastres [a], Yang Yang [b,*], Carol X. Zhang [c]

[a] Department of Tourism, Event and Sport Management, School of Health and Human Sciences, Indiana University Indianapolis, USA
[b] School of Sport, Tourism and Hospitality Management, Temple University, USA
[c] Nottingham University Business School, University of Nottingham, UK

ARTICLE INFO

ABSTRACT

Background

- Risks, representing uncertainties with potentially undesirable outcomes, such as economic losses or injury (Williams & Baláž, 2015), are intrinsic to tourism activities.

- For numerous destinations, the experiences during the pandemic underscore the significance of risk and crisis management, making risk mitigation a priority within their crisis management plans, even beyond the pandemic (Yang et al., 2021).

Background

Research Gap
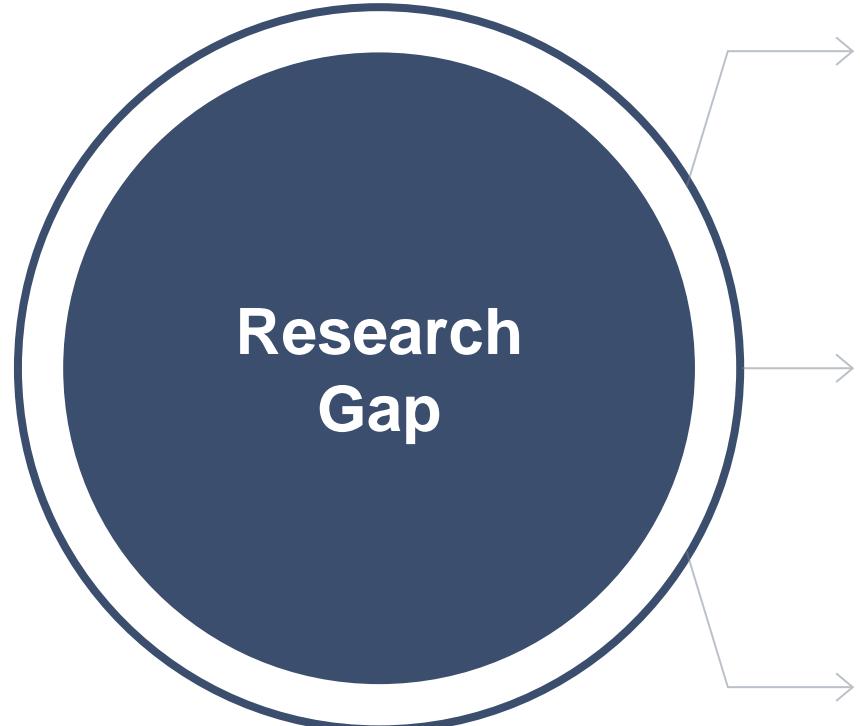
Absence of an overarching framework

Endeavored to develop scales or models that fit this context, leading to inconsistent approaches and conflicting propositions

Validity of tourists' risk perceptions

A lack of conceptual clarification has spurred confusion about key notions related to these perceptions

Doubtful credibility and utility

Shallow understandings of these perceptions in seeking to advance crisis management knowledge

Background

- This study is based on the PSALSAR method, a multi-step approach comprising a protocol search, appraisal, synthesis, analysis, and reporting (Mengist et al., 2020).

- As such, this study's findings paint a clear picture of the impacts of risk perceptions in tourism to inform subsequent research and practices addressing this matter in tourism crisis management.

- The following questions guided this study:

  - 1. How are risk perceptions being studied in the COVID-19 pandemic literature within tourism?

  - 2. Which model can best explain the effects of risk perception–related variables on people's behavioral responses in a global pandemic context within tourism?

Model 1
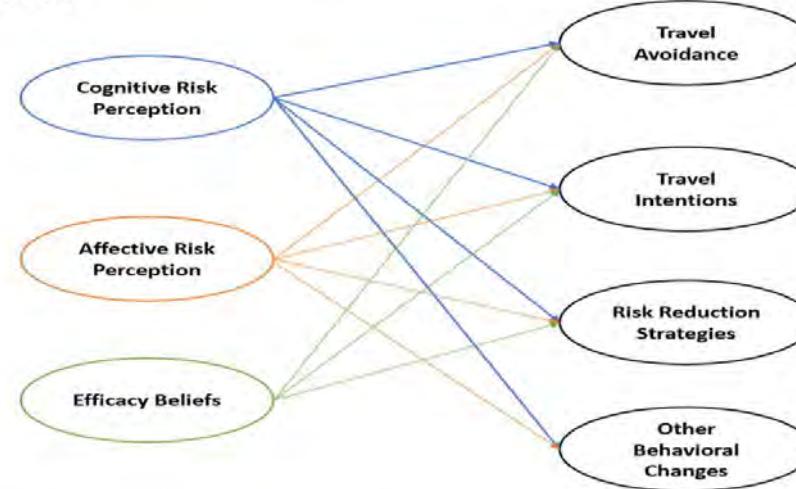
Both risk perception–related variables and outcome variables are treated as parallel constructs.

Model 2
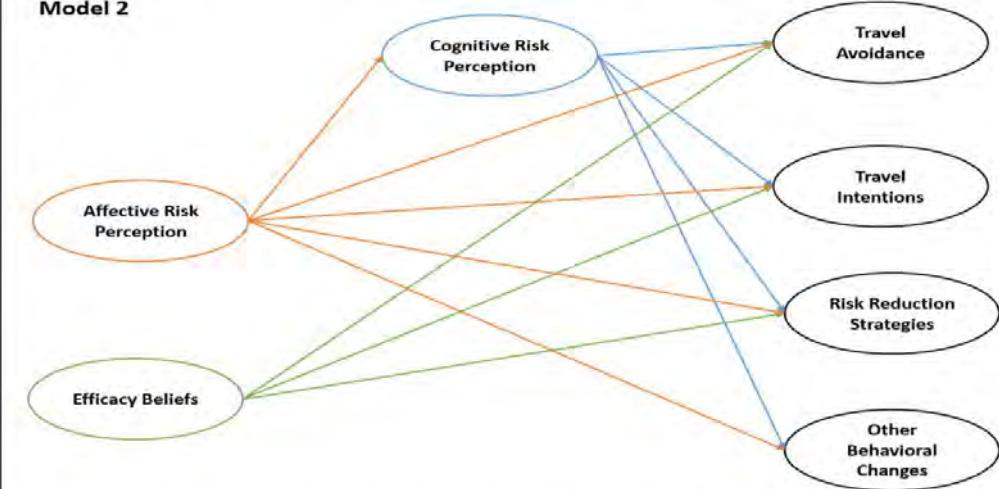
Cognitive perceived risks as a mediator; outcome variables are parallel.

Model 3
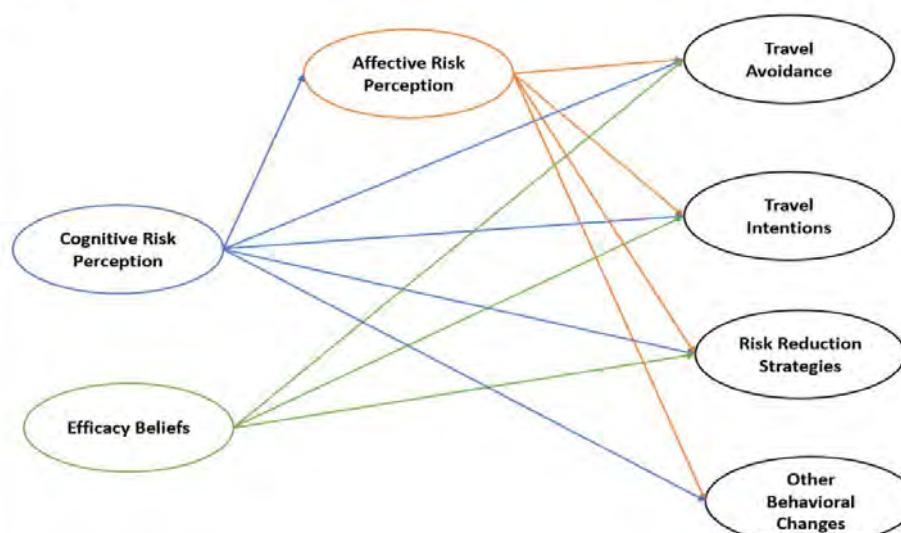
Affective perceived risks as a mediator; outcome variables are parallel.

Model 4
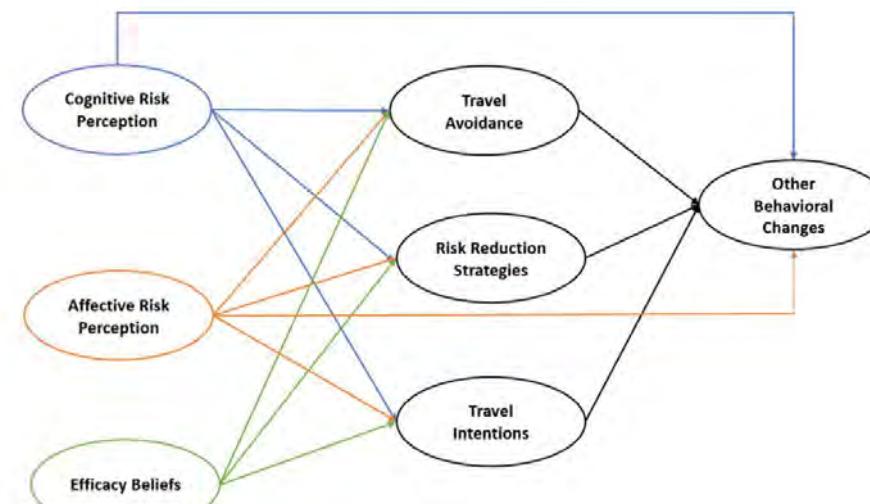
Risk perception–related variables are parallel; outcome variables are re-arranged to reflect the scope of differences.

Model 5
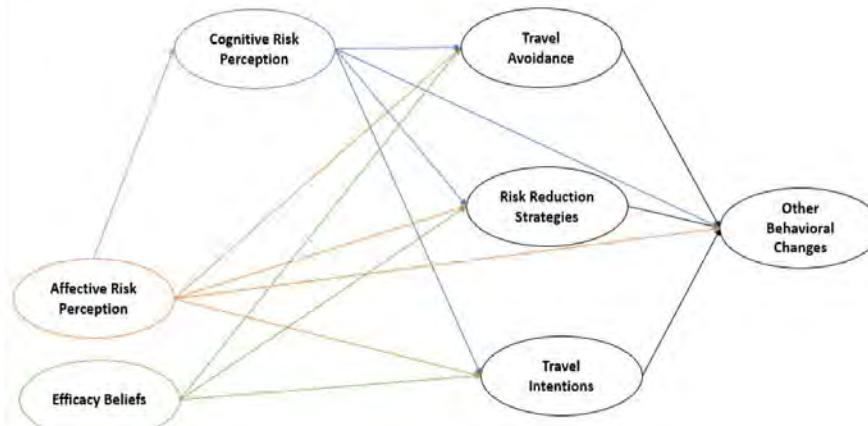
Cognitive perceived risks as a mediator; outcome variables are re-arranged to reflect the scope of differences.

Model 6

Affective perceived risks as a mediator; outcome variables are re-arranged to reflect the scope of differences.

Model 7
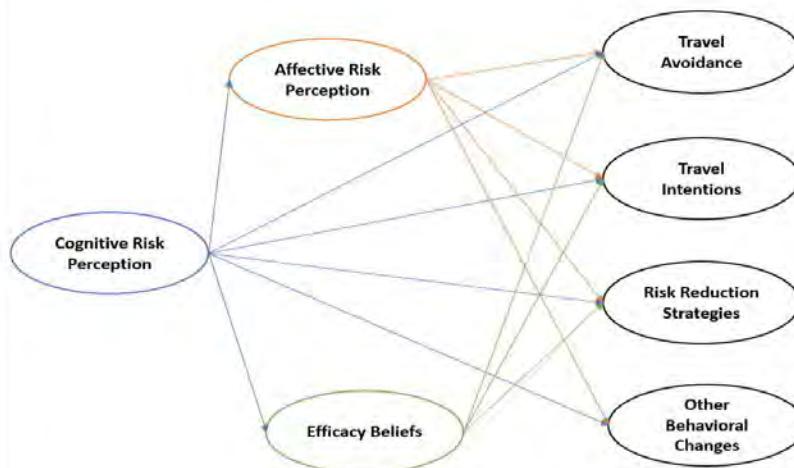
Affective perceived risks and efficacy beliefs as dual mediators; outcome variables are parallel.

Model 8
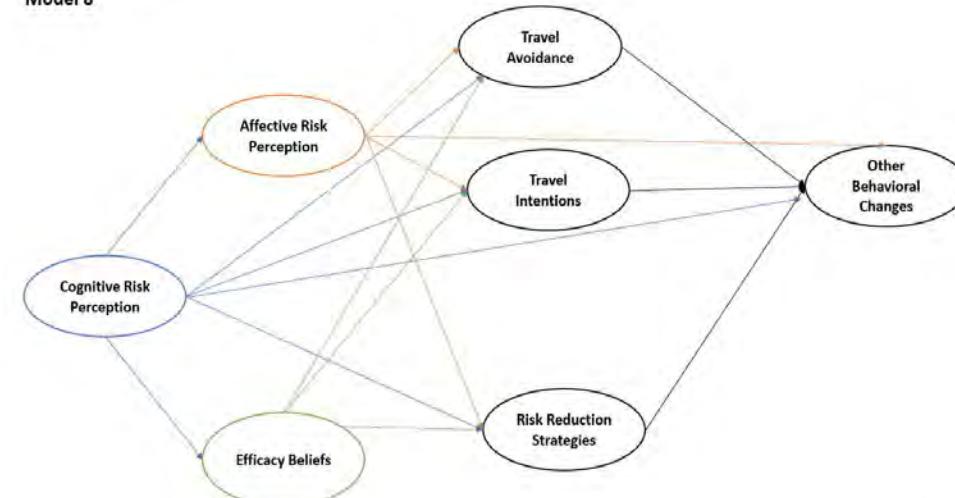
Affective perceived risks and efficacy beliefs as dual mediators; outcome variables are re-arranged to reflect the scope of differences.

Research Design

I. Protocol Search
- Identify search scope and strategy
- Search for studies investigating the effects of risk perceptions on behavioral outcomes in tourism

Scope: To explore how risk perceptions are being studied in tourism during COVID-19.
To identify the model with best fit to illustrate the relationships between risk perception related variables and behavioral outcomes

II. Appraisal
- Search major databases
- Establish criteria for exclusion of articles.

Criteria: quantitative studies, including the construct of risk perception, conducted during COVID-19 times
Data Sources: Emerald, SAGE, Springer, Taylor & Francis, ScienceDirect, Web of Science
Final Sample: 108 journal articles

III. Synthesis
- Develop the coding scheme/template
- Finalize the unit of analysis and code the data

Major Categories:
Article Information: title, publication year, journal, author(s), DOI, Source
Study Information: sector, theoretical framework, Study Design, study site/region, data collection time
Methodology Information: research design, population, sampling method, sample size
Construct Information: Risk perception variables, behavioral outcome variables,.
Measurement Information: mean, standard deviation, Cronbach's α, correlation coefficients

IV. Analysis
- Quantify the categories and coding the data
- Systematic review: Identify the trends/ knowledge gaps and compare results
- Meta-Analysis: Identify model with the best fit model of risk perception related variables and behavioral outcomes

V. Report
- Develop conclusions and implications

Systematic Analysis: Developed an assessment tool and an overview of the tourism risk perception research.
Meta-Analysis: Testing competing models through meta-analysis

Empirical results

Variable	1	2	3	4	5	6
1. Cognitive risk perception						
2. Affective risk perception	0.47923 95% CI = (0.3647, 0.5937)** (N = 13856, K = 31)					
3. Efficacy beliefs	0.21240 95% CI = (0.1294, 0.2953)** (N = 26559, K = 60)	-0.03743 95% CI = (-0.271, 0.1963) (N = 6220, K = 11)				
4. Travel intention	0.00651 95% CI = (-0.051, 0.0647) (N = 62268, K = 100)	-0.17511 95% CI = (-0.335, -0.015)** (N = 10857, K = 28)	0.15520 95% CI = (0.0496, 0.2607)** (N = 12569, K = 32)			
5. Travel avoidance	0.34654 95% CI = (0.2223, 0.4707)** (N = 11513, K = 23)	0.38872 95% CI = (0.2468, 0.5305)** (N = 4959, K = 11)	-0.06965 95% CI = (-0.229, 0.0897) (N = 3109, K = 4)	-0.06187 95% CI = (-0.235, 0.1122) (N = 1799, K = 4)		
6. Risk reduction	0.39837 95% CI = (0.3245, 0.4722)** (N = 26466, K = 46)	0.35577 95% CI = (0.1916, 0.5199)** (N = 5346, K = 13)	0.48247 95% CI = (0.4116, 0.5533)** (N = 31665, K = 40)	0.16658 95% CI = (0.0271, 0.3059)** (N = 9475, K = 21)	0.38814 95% CI = (0.3881, 0.3881)** (N = 1235, K = 1)	
7. Other behavioral outcomes	-0.27257 95% CI = (-0.407, -0.137)** (N = 40521, K = 38)	-0.09382 95% CI = (-0.270, 0.0832) (N = 4654, K = 10)	0.21705 95% CI = (-0.052, 0.4861) (N = 2324, K = 5)	0.17616 95% CI = (-0.114, 0.4664) (N = 4734, K = 8)	0.45311 95% CI = (0.3340, 0.5722)** (N = 1007, K = 2)	0.30798 95% CI = (0.1533, 0.4625)** (N = 2812, K = 7)

Empirical results

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Root mean square error of approximation	0.391	0.375	0.367	0.275	0.273	0.275	0.36	0.257
Akaike information criterion	77665.51	77968.09	77781.07	75107.4	75409.97	75113.4	78187.72	75226.96
Bayesian information criterion	77766.91	78082.16	77895.15	75221.48	75536.72	75246.49	78308.14	75366.39
Comparative fit index	0.508	0.55	0.562	0.837	0.830	0.859	0.527	0.850
Tucker-Lewis index	-0.476	-0.286	-0.253	0.268	0.318	0.296	-0.243	0.370
Standardized root mean squared residual	0.135	0.149	0.136	0.077	0.089	0.077	0.155	0.081
Coefficient of determination	0.597	0.569	0.574	0.703	0.549	0.657	0.359	0.519

Empirical results

- Results revealed the parallel nature of risk perception–related variables and outlined the tight associations between behavioral outcomes.
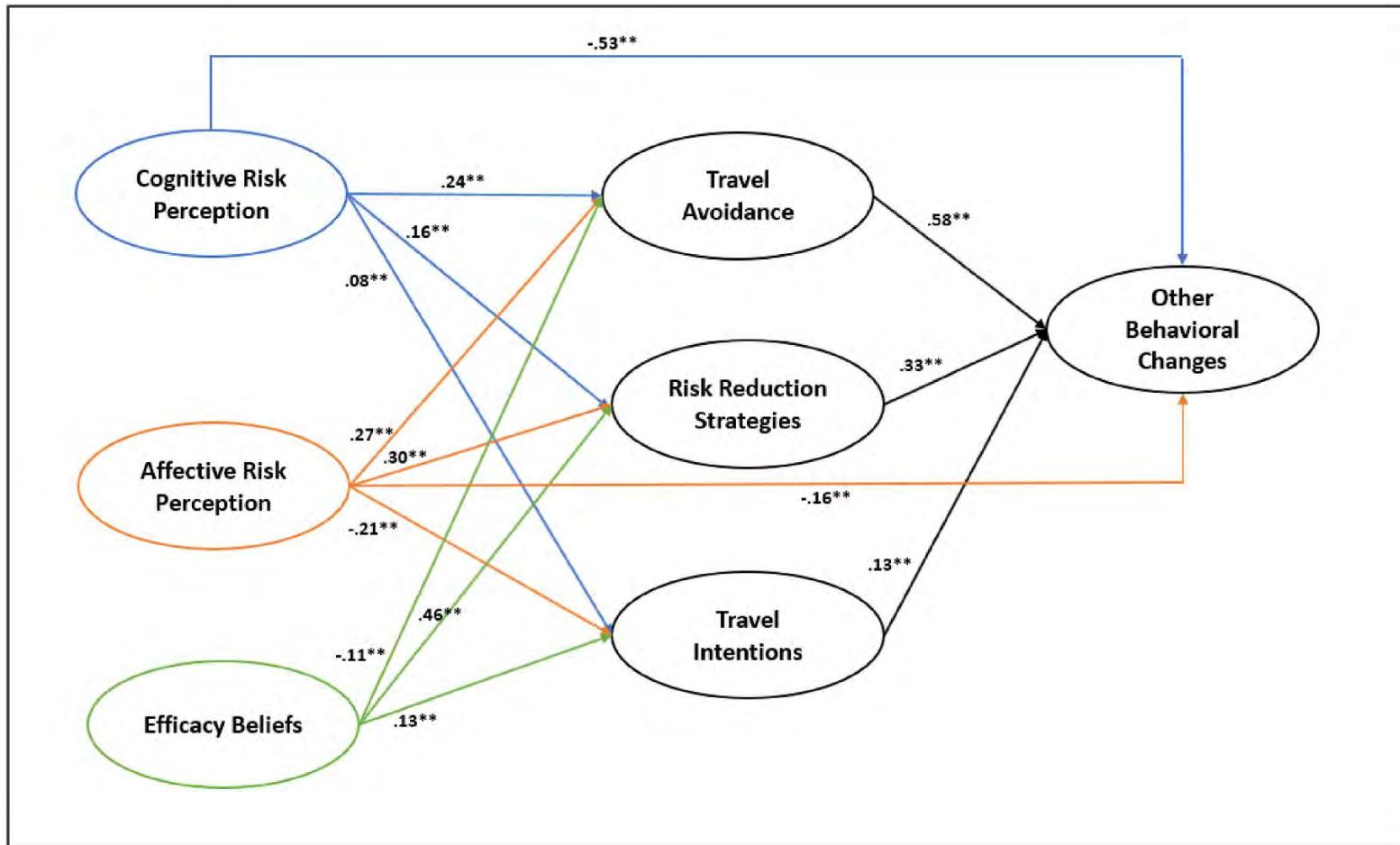
Fifteen Years of Research on Customer Loyalty Formation: A Meta-Analytic Structural Equation Model

Kevin Kam Fung So[1,2], Yang Yang[3],
and Xiang (Robert) Li[3]

School of Sport, Tourism and Hospitality Management

	Reliability (loyalty)	Reliability (satisfaction)	Reliability (value)	Reliability (quality)	Corr(loyalty, satisfaction)	Corr(loyalty, value)	Corr(loyalty, quality)	Corr(satisfaction, value)	Corr(satisfaction, quality)	Corr(value, quality)
seven-point	0.0282**	0.0384**	0.0201	0.0128	-0.0251	0.0431	-0.102	0.00479	0.0524	-0.00121
	(0.012)	(0.015)	(0.019)	(0.018)	(0.034)	(0.059)	(0.084)	(0.086)	(0.080)	(0.058)
Insample	-0.0305***	-0.0240	-0.0252	-0.0415*	-0.00846	-0.106	-0.0670	0.0860	-0.0274	-0.0728**
	(0.010)	(0.018)	(0.021)	(0.023)	(0.039)	(0.079)	(0.052)	(0.095)	(0.062)	(0.035)
Journal-specific effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-specific effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
constant	0.944***	0.965***	1.017***	1.195***	0.781***	1.105**	0.951**	0.312	0.346	1.016***
	(0.093)	(0.119)	(0.118)	(0.169)	(0.264)	(0.479)	(0.355)	(0.541)	(0.371)	(0.253)
N	134	110	101	89	117	89	82	63	65	60
R-sq	0.295	0.322	0.307	0.396	0.295	0.253	0.430	0.331	0.723	0.799
adj. R-sq	0.147	0.141	0.100	0.206	0.121	0.020	0.243	0.037	0.597	0.688

4. Meta-analysis for experiment design

Introduction

- What shapes a helpful review?

Review-related factors	Reviewer-related factors
• Valence • Readability • Review length • Review age	• Reviewer expertise • Profile disclosure

Introduction

- Heterogeneous or even conflicting results
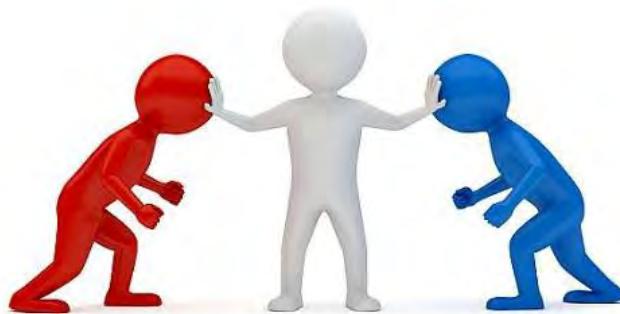
Practitioners

Academics

Introduction

- Research gap

  - Hong, Xu, Wang, & Fan (2017)

  - Purnawirawan, Eisend, De Pelsmacker, & Dens (2015)

- Research question

  - 1) What are the critical determinants of online review helpfulness?

  - 2) What are the contextual factors that moderate the effect sizes?

Hypothesis

## 1. Review valence

- Review valence= overall evaluation of consumption experience

    -> estimate service quality->helpful

- Negativity bias (Wu, 2013)

	H1 -	
Review valence	→	**Helpfulness**
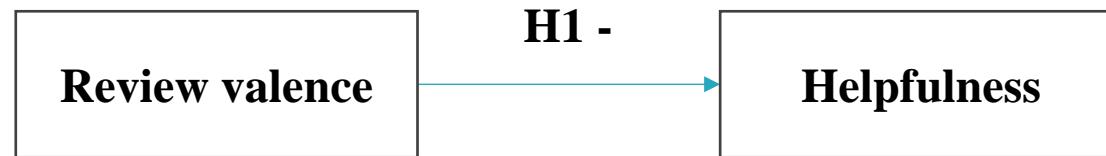
2. Readability

- The ease of and understandability of a review (Filieri & McLeay, 2014)

	H2 +	
Review readability	→	**Helpfulness**
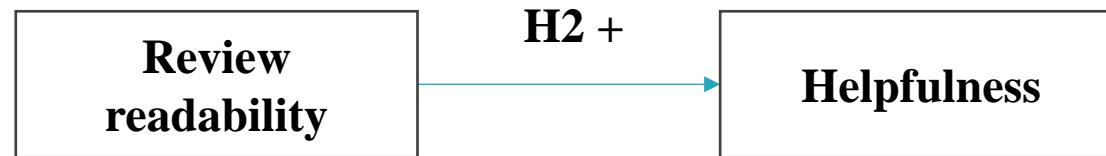
Hypothesis

3. Review length

- Longer reviews: more informative and diagnostic
- Uncertainty reduction theory (Parks & Adelman, 1983)

| Review length | **H3 +** → | Helpfulness |
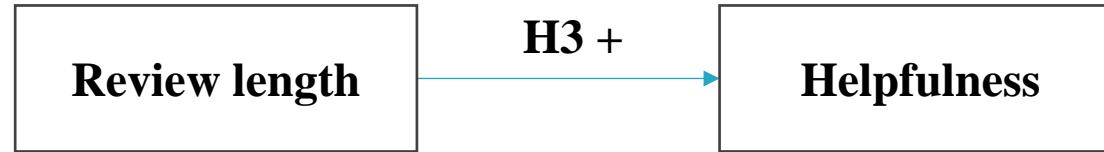
4. Review age

- Recent reviews: more accurate and reliable (Filieri & McLeay, 2014)
- Recency effect Sparks & Browning (2011)
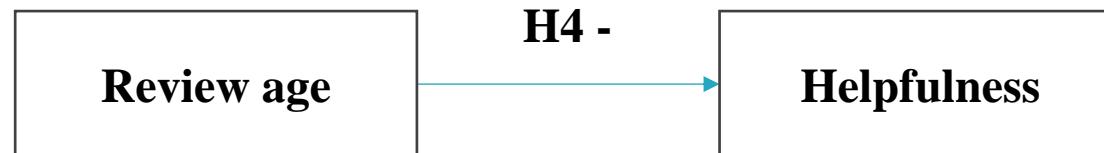
| Review age | **H4 -** → | Helpfulness |

5. Reviewer expertise

- Experts' reviews are more informative and credible
- Uncertainty reduction theory (Parks & Adelman, 1983)

Reviewer expertise	**H5 +** →	Helpfulness
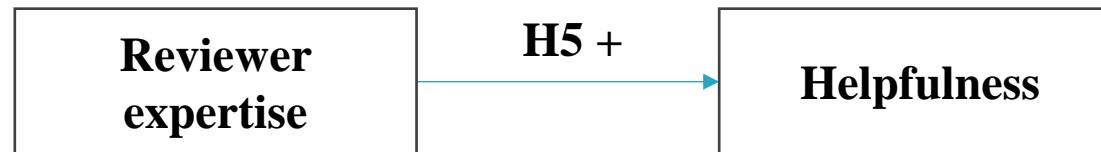
6. Profile disclosure

- Profile disclosure-> higher source credibility-> helpfulness

Profile disclosure	**H6 +** →	Helpfulness
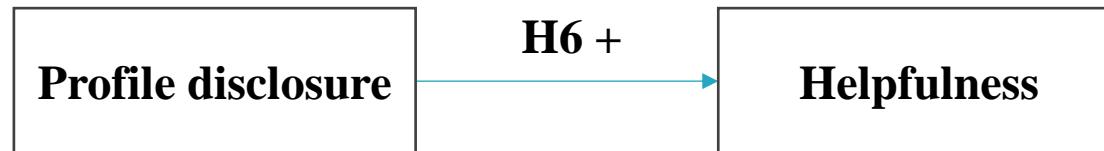
Hypothesis

• Moderators

Moderator	Variable name	Coding scheme
Data sources	*data_source*	1= web-scraping data; 2 = first-hand data
Service types	*service_type*	1 = restaurant; 2 = hotel; 3= travel
Cultural differences	*culture_diff*	1 =others; 2 = U.S.
The year of data collection	*year_data*	1 = before-2013; 2 = after-2013
The measurement of review helpfulness	*measure_help*	1 = votes; 2 = perceived helpfulness 3 = ratio

Hypothesis

Review-related factors
- Review Valence
- Readability
- Review length
- Review age

Reviewer-related factors
- Reviewer Expertise
- Profile disclosure

H1(-)
H2(+)
H3(+)
H4(-)
H5(+)
H6(+)

Helpfulness

Moderators:
- Data source; H7
- Service type; H8
- Cultural difference; H9
- Year of Data Collection; H10
- Helpfulness Measurement; H11

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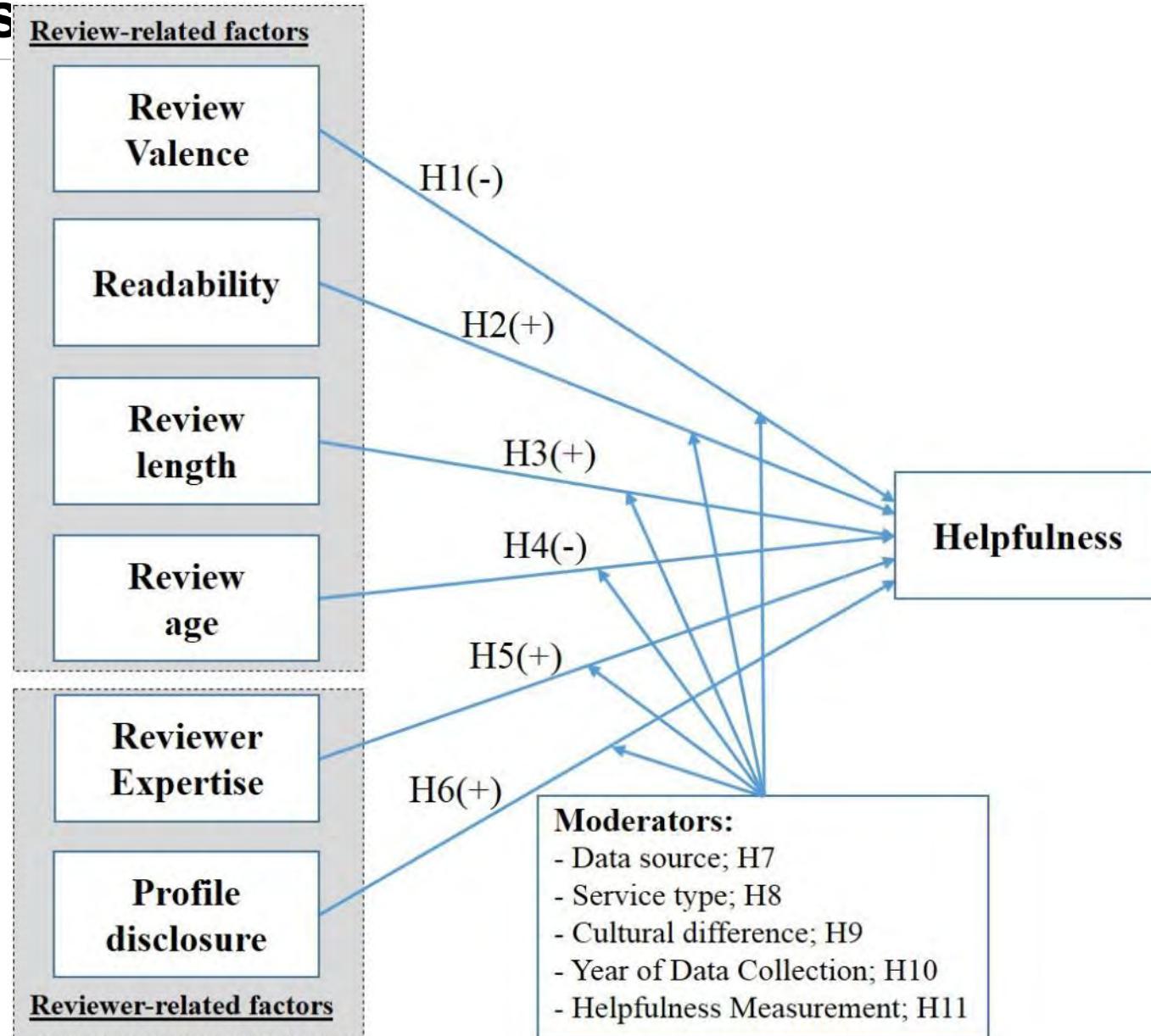
Research method

- Literature Collection

  - - 31 primary studies, resulting in 86 cases.

  - - Minimum number of studies: 2 (Chambless & Hollon, 1998)

- Coding of Effect Size

  - Correlation coefficient (i.e., *r*).

  - *r* is a scale-free metric: more interpretable and comparable

  - Transformation (26.7%): t-value, F-value, and standardized mean-difference

Research method

- Corrected mean correlation ($\bar{r}$) for each target relationship:

$$\bar{r} = \frac{\sum(N_i \times r_i)}{\sum N_i}$$

- 95% CI that excludes zero indicates a significant correlation (Hunter & Schmidt, 2000)

- 80% credibility interval (CV) was further computed to assist the detecting of potential moderating effects

Research method

- **Traditional meta-analysis methods**: Fisher's r-z transformation

  - Drawback: upwardly bias the estimate of the mean correlations (Schmidt & Hunter, 2000).

- **Our method: Hunter-Schmidt's method** (Schmidt & Hunter, 2000).

  - Correcting for a set of artifacts (e.g., sampling error, measurement error, and range restriction)

  - Giving more weights to studies with larger sample sizes

  - Bare-bones meta-analysis (BBMA)

Results

- Main effect of helpfulness determinants

Variable	k	N	$\bar{r}$	SD_r	CV	CI
Review valence	17	1,381,644	-0.013	0.099	[-0.139, 0.114]	[-0.060, 0.034]
Readability	13	1,122,868	-0.001	0.013	[-0.018, 0.016]	[-0.008, 0.006]
Review length	16	1,296,476	0.218	0.027	[0.183, 0.253]	[0.205, 0.232]
Reviewer expertise	20	2,305,165	0.064	0.122	[-0.092, 0.221]	[0.010, 0.118]
Review age	8	1,105,120	0.053	0.072	[-0.039, 0.144]	[0.003, 0.102]
Profile disclosure	12	2,124,281	0.036	0.030	[-0.002, 0.074]	[0.019, 0.053]

H4, H5, and H6: supported;

H1, H2, H4: rejected

Results

- Subgroup analysis results of review valence

Variable	k	N	$\bar{r}$	SD_r	CV	CI
Review valence						
data_source ⭐						
Web-scraping	13	1,380,807	-0.013	0.098	[-0.138, 0.113]	[-0.066, 0.041]
First-hand	4	837	0.306	0.262	[-0.019, 0.632]	[0.049, 0.563]
service_type						
Restaurant	7	238,631	-0.053	0.035	[-0.097, -0.008]	[-0.079, -0.027]
Hotel	10	1,143,013	-0.004	0.105	[-0.139, 0.131]	[-0.070, 0.061]
culture_diff ⭐						
US	3	57,446	0.387	0.027	[0.353, 0.422]	[0.356, 0.418]
Others	13	1,323,651	-0.030	0.053	[-0.098, 0.038]	[-0.059, -0.001]
year_ data						
Before-2013	6	78,865	-0.063	0.060	[-0.138, 0.013]	[-0.111, -0.015]
After-2013	11	1,302,779	-0.010	0.100	[-0.137, 0.118]	[-0.069, 0.049]
measure_help ⭐						
Votes	12	1,380,260	-0.013	0.098	[-0.138, 0.113]	[-0.068, 0.043]
Perceived helpfulness	4	837	0.306	0.262	[-0.019, 0.632]	[0.049, 0.563]

H7, H9, and H11: supported

Results

- Subgroup analysis results of readability

Variable	k	N	$\bar{r}$	SD_r	CV	CI
Readability						
service_type						
Restaurant	6	27,562	0.031	0.047	[-0.026, 0.088]	[-0.006, 0.069]
Hotel	5	1,075,079	-0.002	0.005	[-0.008, 0.004]	[-0.006, 0.003]
Travel	2	20,227	-0.008	0.065	[-0.090, 0.074]	[-0.098, 0.082]
year_data ★						
Before-2013	3	48,877	-0.020	0.000	[-0.020, -0.020]	[-0.029, -0.011]
After-2013	10	1,073,991	0.000	0.013	[-0.017, 0.016]	[-0.008, 0.008]

H10: rejected

Results

- Subgroup analysis results of review length

Variable	k	N	$\bar{r}$	SD_r	CV	CI
Review length						
service_type						
Restaurant	7	174,028	0.231	0.046	[0.173, 0.289]	[0.197, 0.265]
Hotel	7	1,102,574	0.216	0.022	[0.188, 0.244]	[0.199, 0.232]
Travel	2	19,874	0.252	0.024	[0.224, 0.279]	[0.219, 0.284]
culture_diff						
US	13	1,290,203	0.218	0.027	[0.184, 0.252]	[0.203, 0.233]
Others	2	1,183	0.261	0.109	[0.130, 0.392]	[0.110, 0.412]
year_data						
Before-2013	5	94,569	0.211	0.066	[0.127, 0.295]	[0.153, 0.269]
After-2013	11	1,201,907	0.219	0.022	[0.192, 0.246]	[0.206, 0.23]

H8-H10: rejected

Results

- Subgroup analysis results of review age

| Variable	k	N	$\bar{r}$	SD_r	CV	CI
Review age						
service_type						
Restaurant	3	95,569	0.006	0.156	[-0.194, 0.205]	[-0.171, 0.182]
Hotel	4	989,877	0.050	0.013	[0.033, 0.066]	[0.037, 0.062]
year_data						
Before-2013	3	52,141	-0.094	0.165	[-0.304, 0.117]	[-0.280, 0.092]
After-2013	5	1,052,979	0.060	0.054	[-0.009, 0.129]	[0.013, 0.107]

H8 and H10: rejected

Results

- Subgroup analysis results of profile disclosure

Variable	k	N	$\bar{r}$	SD_r	CV	CI
Profile Disclosure ★						
service_type						
Restaurant	5	156,490	0.126	0.024	[0.096, 0.156]	[0.105, 0.147]
hotel	7	1,967,791	0.029	0.014	[0.011, 0.047]	[0.018, 0.039]
year data ★						
Before-2013	4	53,390	-0.021	0.035	[-0.063, 0.022]	[-0.055, 0.013]
After-2013	8	2,070,891	0.037	0.028	[0.002, 0.073]	[0.018, 0.057]
measure_help ★						
votes	9	2,122,808	0.036	0.029	[-0.002, 0.073]	[0.017, 0.055]
ratio	2	1,072	0.143	0.064	[0.082, 0.203]	[0.055, 0.231]

H8 - H10: supported;

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Conclusion and implications

- ## Most influential determinant:

  - ### Hong et al. (2017): profile disclosure
  - ### Our study: review length

Mean EF size comparison

	Hong et al. (2017)	This study
Review length	0.114	0.218
Reviewer expertise	0.201	0.064
Review age	0.094	0.053
Profile disclosure	0.250	0.036
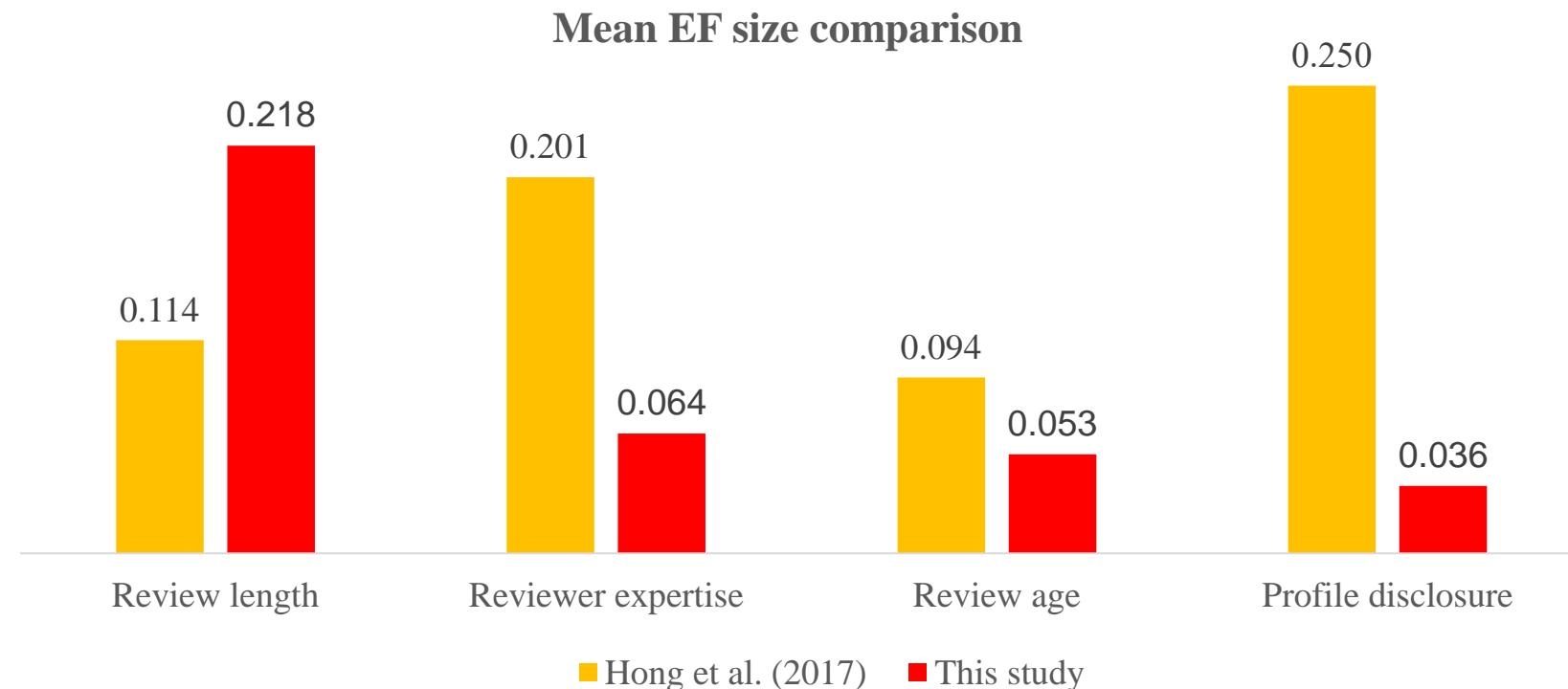
Conclusion and implications

- Effect sizes are sensitive (review valence and reviewer expertise)

- Cultural differences matter

- Customers' dynamic and adaptive behaviors

  - Before 2013: relying on review valence and reviewer expertise

  - After 2013: reviewer's profile disclosure

5. Summarization

Other major topics

- Publication bias detection

- Bayesian averaging

- Pre-registration

Advantages of meta-analysis

- The results of the included studies are quantified to a standard metric thus allowing for statistical techniques for further analysis.

- Less biased and more replicable

- Able to establish generalizability across many studies (and study characteristics).

- Analyzing the results from a group of studies can allow more accurate data analysis

- Increased power

- Enhanced precision due to averaging out the sampling error deviations from the true values

- Provides corrections to mean values with distortions due to measurement error and other possible artefacts

Limitations

- Requires a huge amount of effort
- "Apples and oranges"; comparability of studies is often in the "eye of the beholder" (Wilson)
- Most meta-analyses include "blemished" studies
- Various forms of subjectivity
- What studies to include in the meta analyses
- Coding of attributes
- Often can't obtain study results or can't summarize as effect sizes
- Analysis of between study differences is fundamentally correlational

What we can do?

- Do your own meta-analysis as a type of literature review!!

- Purpose-built
  - Comprehensive Meta-analysis (commercial)

- Extensions to standard statistics packages
  - SPSS, Stata and SAS macros, downloadable from http://mason.gmu.edu/~dwilsonb/ma.html
  - Stata add-ons, downloadable from http://www.stata.com/support/faqs/stat/meta.html
  - R libraries

Enhancing the Reproducibility of Your Research

A Guide to transparent methods, comprehensive information disclosure, and meta-analysis friendly data provision


Providing Pivotal Statistics for Meta-Analysis

Meta-analysis ready data: statistics at the core

Disclosing Necessary Information for Empirical Studies

Empirical study essentials: The what, why, and how

Transparency in Research Methods

Methodological details: The cornerstone of reproducibility

Thanks for your attention

dryangyang.com