

Assortative Matching of Tourists and Destinations: Agents or Algorithms?

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Abstract: We propose that assortative matching, a well-established paradigm in other industry sectors and academic disciplines, can underpin the concept of destination matching. This provides a new foundation to integrate research concepts and terminology in destination marketing and destination choice. We argue that the commercial tourism industry already applies destination matching approaches, with three historical phases. Initially, matching of tourists and destinations relied on the tacit expertise of specialist agents. This still applies in specialist subsectors. For generalist travel and accommodation, human agents were partially replaced by online travel agents, OTAs, which are customised algorithms operating only in the travel sector. These still exist, but their share price trends suggest decreasing significance. Currently, automated assortative algorithms use multiple sources of digital data to push appealing offers to potential purchasers, across all retail sectors. Digital marketing strategies for tourism products, enterprises, and destinations are now just one category of generalised product–purchaser matching, using entirely automated algorithms. Researchers do not have access to proprietary algorithms, but we can identify which components they incorporate by analysing their underlying patents. We propose that theories of destination marketing and choice need to reflect these recent and rapid real-world changes via deliberate analysis of destination matching.

Keywords: marketing; choice; brand; image; congruence; assortative; fashion



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1. Introduction

Every journey matches people with places. Every day, except during global shut-downs, millions of tourists are matched with destinations. In tourism research, this has been analysed via two parallel and complementary fields, destination marketing and destination choice. Of course, these fields overlap. Here, we propose that the overlap itself, the process of matching between destination marketing and tourist destination choice, deserves greater attention. We suggest that it could be analysed as assortative matching. This approach is used widely in other sectors and disciplines, but not currently in tourism research. In tourism practice, destination matching has relied historically on tacit knowledge held by expert travel agents. Currently, the fastest growing mechanism is through cross-links between search engines and social media, delivering customised and targeted purchase opportunities. We argue that tourism research frameworks should include these new practices.

Our approach here is conceptual. As in most research coupled to specific industry sectors, it is commonplace for practical changes in the industry to occur in advance of academic analysis. Few tourists or tourism enterprises read academic articles in tourism journals, and few journal articles make the crossover to mass or social media, or tourism industry communications. As researchers, it is not enough for us to analyse, in ever greater detail, how tourism operates currently. It is equally important for us to analyse trends, and track how tourism is changing. The aim of our contribution here is to suggest, for the

consideration of other tourism researchers, that a very major change in practical tourism destination marketing and choice is occurring under our noses, but that we have not yet started to examine it. That change is the switch to generalised digital marketing, where tourism has no special dedicated marketing system, as it did in the past. It is just one category of marketable products, amongst many others using the same communications channels and assortative matching algorithms.

To make this argument, we use two sets of published materials; but this is not a review of past literature, nor a meta-analysis of content. We use those materials simply to show what kinds of topics they address: a second-tier, “meta-meta”-analysis. The first set is a simple classification of recent academic publications in destination marketing and choice. We use this solely to show the proliferation of conceptual terminology, at ever finer levels of division. The driving force for this is the tourism journal editorial and review system. Articles are only accepted in high-tier tourism journals, if authors can argue that they make new theoretical contributions. Therefore, authors must continually invent new terminology, in order to make such a case. We do not criticise the individual studies. Our argument is that each adds a diminishing marginal advance in knowledge, a focus on smaller and smaller aspects of historical systems; but that meanwhile, those systems are being replaced by alternative approaches, that are not yet studied at all in a tourism context.

The second set shows what they are being replaced by. It is a sample of patents held by large-scale search and social media corporations, that most of us interact with daily. These patents underlie the algorithms by which they identify what each of us might buy, and present us with customised offers from sellers and suppliers. The algorithms are famously confidential, so, as researchers, we cannot analyse them directly. It seems likely that they are based on neural networks, so that even the corporations that own them can only find out what they do by carrying out experiments, such as Google[®] Inc’s widely reported current experiment on news access by Australian citizens. We can, however, determine their capabilities, by analysing the patents held by their parent corporations. These patents, which are publicly available, set out mechanisms in detail. Here, however, our focus is on capabilities rather than mechanisms: again, a “meta-meta” second-tier approach. What we want to show is that those patents contain the capabilities to supplant the industry practices that form the subject of previous academic research in this field. Moreover, if they do, then our research needs new directions.

2. Assortative Matching

Assortative matching occurs whenever two non-substitutable sets of actors or agents each want to choose partners from the other set, subject to constraints and preferences [1–3]. Well-known examples include choice of marriage partners [1,4,5], academic co-authors [6], or residential addresses [7]; allocation of sportspersons between teams [8,9], employees between employers [10,11], or students between universities [12–14]; and reciprocal choice of banks and borrowers [5,15], insurers and insured [15], enterprises and auditors [16], or patients and healthcare providers [17].

3. Complexities

Complexities are added where: sets have unequal sizes, with some members unassigned; matching is one-to-many or many-to-one; different members assign different rankings to members of the other set, or are uncertain what rankings to assign; or matches can be rejected, undone, or repeated. Rankings may be based on parameters that are invisible, unquantified, uncertain, or weighted and aggregated differentially by different members [18]. Information and transactions may be subject to costs, uncertainties, deceptions, unavailability, or overload [19–22]. Matching may be constrained by: distance in time or space; legal, cultural, or political barriers; or unequal size or power [7]. All these complexities can apply for assortative matching of tourists and destinations [23–25].

4. Current Frameworks

Current frameworks for research in destination marketing and destination choice are also complex (Table 1). There are three large-scale frameworks: construction, projection, and perception of destination image; induced, organic, and autonomous information sources; and affective, cognitive, and conative psychological domains. Increasingly fine-grained terms have been proposed (Table 1) and criticised [26]. The closest approaches to the destination matching framework proposed here are concepts such as fashionability [24] and congruency [27–32]. None of these used assortative matching frameworks.

Table 1. Destination Marketing and Choice, Frameworks, and Terminology.

Term or Aspect	References
Authenticity	[33–38]
Brand, brand equity, brand engagement, brand complexity	[25,33,39–42]
Choice and bias	[43–46]
Competitiveness	[47–50]
Content	[51]
Communication: construction, projection, perception	[52–59]
Emotions	[44,60,61]
Extension	[62]
Fascination	[63]
Fashionability	[24]
Fragmentation	[64]
Information: induced, organic, autonomous	[65–69]
Loyalty	[40,53,70]
Memorability	[46]
Personality	[27,29,31,53]
Positioning	[58,71]
Psychological domains: affective, cognitive, conative	[60,61,72–76]
Self-concept and self-congruence	[28,30,32,40,77–80]
Compare cultures	[81]
Tourists of residents	[82,83]
Compare stakeholders	[84]
Damage, repair	[85,86]
Scale	[87,88]
Distance, logistics	[23,89,90]
Change over time	[91]

5. Specialist Travel Agents Using Tacit Expertise

Historically, destination matching has been performed principally by travel agents, who possess knowledge of both destinations and clients. Many tourists have activity preferences, or other criteria restricting destination choice [4,92–94]. This shrinks the sets sufficiently to be matched by specialist travel agents or social-media groups, as in wildlife or adventure tourism [92–95]. In African wildlife tourism, for example, the assortative parameters are: location, luxury, price, wildlife diversity, quality of wildlife viewing, and for some, contributions to conservation and local communities. Priorities are: viewing first, luxury second, and conservation third [95]. Viewing quality depends on: location and available wildlife; lodge history and wildlife habituation; and legal constraints, e.g.,

on open vehicles. Agents aggregate this information as tacit expertise, in order to match their clients to specific destination lodges [95]. This tacit expertise is not codified to algorithmic form.

6. Specialist Travel and Tourism Algorithms

In subsectors with high substitutability, such as flight and hotel bookings, global companies adopted assortative matching algorithms to underpin their marketing engines [96–99]. Research has attempted to adapt and codify travel agent practices to generate specialist algorithms [100–103], and to predict whether or not these so-called online travel agents, OTAs, will supersede human expertise [104,105]. In practice, however, we suggest that these first-generation specialist systems are already being superseded. For many of these first-generation algorithmic matchers, share prices are now declining or stabilised. Rather than trying to add OTAs to marketing strategies [106,107], tourism destinations and enterprises now aim to optimise much more generalised digital marketing strategies.

7. Generalist Algorithms including Tourism

In the second generation, as large search and social media corporations track individual preferences and circumstances with ever finer detail and timeliness, tourism destinations have become simply one of many products pushed to potential purchasers. Matches are identified through location, personal networks, search and purchase histories, written and oral communications and instructions, and even where one looks on one's computer screen (Table 2). Researchers cannot access proprietary algorithms, but patents show how these methods operate, in considerable detail (Table 2).

Table 2. Relevant Patents Held by Booking, Search, and Social Media Corporations.

Assignee	Abbreviated Title	Date	Ref
Amadeus S.A.S.	Maximum availability inventory	11/20	[108]
Amadeus S.A.S.	Product delivery system and method	08/20	[109]
Amadeus S.A.S.	Neural network . . . application navigation	09/19	[110]
Expedia, Inc.	Persona for opaque travel item selection	10/20	[111]
Expedia, Inc.	Disambiguating search queries	07/19	[112]
Expedia, Inc.	. . . automated content generation	07/18	[113]
Facebook, Inc.	User info . . . from third-party applications	05/14	[114]
Facebook, Inc.	Determining user personality . . .	08/17	[115]
Facebook, Inc.	. . . eye tracking data . . .	10/17	[116]
Facebook, Inc.	Real-time tracking of offline transactions	12/20	[117]
Facebook, Inc.	Modifying capture of video data . . .	12/20	[118]
Facebook, Inc.	. . . generating digital channel content	12/20	[119]
Facebook, Inc.	Navigating through content items	12/20	[120]
Facebook, Inc.	. . . system for product clustering	12/20	[121]
Facebook, Inc.	Face detection for video calls	12/20	[122]
Facebook, Inc.	Haptic communication system . . .	12/20	[123]
Facebook, Inc.	Placing locations in a virtual world	12/20	[124]
Facebook, Inc.	Ranking feed based on likelihood of user . . .	12/20	[125]
Facebook, Inc.	. . . tailored advertisements in conversation	12/20	[126]
Facebook, Inc.	Predicting . . . location of online user	12/20	[127]
Facebook, Inc.	Wavefront sensing [reflected infrared light]	12/20	[128]
Facebook, Inc.	Distribution . . . URL's to external websites	12/20	[129]

Table 2. *Cont.*

Assignee	Abbreviated Title	Date	Ref
Facebook, Inc.	Matching and ranking content items	12/20	[130]
Facebook, Inc.	... securing data to a ... distributed ledger	12/20	[131]
Facebook, Inc.	Computing a ranked feature list ...	12/20	[132]
Facebook, Inc.	... analysing insertion points in ... video	12/20	[133]
Facebook, Inc.	Capturing a cluster ... targeted ... exposure	12/20	[134]
Facebook, Inc.	... data to predict affinity ... content item	11/20	[135]
Facebook, Inc.	... performance of content item campaigns	11/20	[136]
Facebook, Inc.	Identity prediction for unknown users ...	11/20	[137]
Google LLC	Recorded ... hotword trigger suppression	12/20	[138]

While one might think that those are intrusive, some countries have now adopted facial recognition technology nationally [139], and suggestions are already being made, only slightly tongue-in-cheek, as to how marketers will shortly sell globalised individual personal data [140].

The patents listed in Table 2 were identified and cross-checked using Google[®] patent searches, national patent directories (principally USA), litigation reports, corporate annual reports, compulsory stock exchange filings, and professional biographical reports of initial patent owners. Patents listed are only a very small sample of the total held. Most of the patents listed above for Facebook[®] Inc. were granted in the first half of December 2020, but some were applied for 1–3 years earlier. This may reflect the politics of the 2016–2020 US Administration, which included disputes with technological and social media corporations.

Digital marketing strategies, in tourism as in other retail sectors, now aim to target relevant individuals, identify likely purchases, and present them directly with product offers. Destination marketing organisations use similar approaches, targeting potential visitors through advertising on all forms of digital communications. Under these approaches, offers for tourism products and destinations are treated simply as one form of targetable communication, and identification of potential tourists is simply one form of individualised market targeting. The algorithms used to carry out targeted digital advertising rely on assortative matching as their core process.

8. Conclusions

Destination matching does not supersede, contradict, or compete with frameworks for destination marketing and choice. It focusses on the links between them. In addition, it reflects changes in the tourism industry. Assortative matching algorithms are already used to market destinations to tourists via social media. Published research on tourism destination marketing and choice does not currently include assortative matching, and published research on assortative matching does not include tourism. However, now that these assortative matching processes are used increasingly in real-life tourism marketing, we argue that they should also be addressed in tourism research. We therefore propose that, in addition to marketing by destinations and destination choice by tourists, we should analyse the practical processes of assortative matching between tourists and destinations.

The use of generalised digital marketing, in tourism as in other sectors (including universities), has been expanding over the past few years. Most tourism destinations and enterprises routinely include a range of paid and unpaid search optimisation strategies, social media campaigns, and other digital matching approaches in their marketing portfolios. Meanwhile, in 2020 and perhaps also 2021, the tourism industry worldwide has experienced a major hiatus as a result of the COVID-19 pandemic, with international travel almost abolished, and even domestic travel severely curtailed. This has provided an opportunity to restructure products, itineraries, and marketing, including destination

marketing. National tourism marketing agencies and portfolios recognise this well. As of 28 January 2021, for example, Tourism New Zealand has launched a new campaign that does not seek to sell directly, but rather to influence the selection of specific destinations within New Zealand that are featured by private social media influencers [141].

The degree to which this strategy succeeds will provide a partial practical test of the arguments we make here, but at a very broad scale. From a research perspective, we can focus on destination matching mechanisms, testing how much tourists rely on the use of different digital sources to identify future destinations. The first tenet of marketing, perhaps, is to make people with money want what one has to sell. The combination of search and social media algorithms can achieve that, *par excellence*. Should we not study how that works, for tourism specifically?

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