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# The policy responses of tourism agencies to emerging digital skills constraints: A critical assessment of six countries

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## Abstract

This paper analyses policies and practices designed to support digital transformation in the tourism workforce in six OECD countries, namely Germany, Greece, Iceland, New Zealand, Switzerland, and the United Kingdom. Data for the project were gathered via a questionnaire survey, interviews with key informants and examination of various policy documents in 2021. Contrasting practice in relation to digital skills development is revealed. Significant deficiencies are evident in relation to the availability of high-quality data, evaluation, understanding, leadership, and infrastructure among the six countries. Ways in which effective policy development might emerge are suggested.

## KEYWORDS

digitalisation, OECD, skills gaps, skills shortages, tourism policy

## 1 | INTRODUCTION

The so-called Fourth Industrial Revolution (i4.0) constitutes a fundamental change in how economies develop and how businesses create value (Schwab, 2017). As with previous industrial revolutions, it stems from far-reaching technological innovations (Morrar et al., 2017; Skilton & Hovsepian, 2018). From the early 2000s, proponents of i4.0 anticipated the rise of new products and processes through e-tourism (Buhalis, 2003). Within 10 years, travel and tourism had become the largest category of products and services sold globally over the internet. This was made possible as digitalisation developed from being a driver of marginal efficiency to an enabler of dynamic innovation (Assaf & Tsonas, 2018).

A diverse range of topics associated with the current and anticipated digital transformation of tourism such as 'technological disruptions in services (Buhalis et al., 2019)', 'service robots' (Choi, Choi, et al., 2020; Choi, Oh, et al., 2021; Tussayadiah, 2020), and 'progression and development of information and communication technology' (Law et al., 2020) have been explored in the literature.

However, little of this research has considered the related workforce and work organisation changes and in particular, the skills development challenges. This is surprising because the contribution skilled employees make to service quality, productivity and innovation is well-documented and technological advances affecting organisational innovation will impact on working practices and workforce skills needs (Sigala, 2020).

A recent OECD research report entitled *Preparing the Tourism Workforce for a Digital Future in the Era of COVID-19* (OECD, 2021) identified significant digital skills constraints among its member states. In doing so, it highlighted market failure, which, it argued, necessitated public policy intervention to rectify. Arguably, aspects of the analysis were predictable: market failures have long been associated with justifications for state intervention in tourism planning generally (see for example, Choy, 1991) and skills development specifically (e.g. Baum & Szivas, 2008). The novelty of the OECD's research lay in the connection it made between deficient *digital* skills utilisation and supply, the potential negative implications of this as a transformation constraint

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to the sector and how public policy interventions were required if improvement was to be secured.

This paper shifts attention from the OECDs cross-country review of the digital skills challenges faced by the sector to an assessment of public policymaker responsiveness focussed on country-level case studies for six selected countries. The OECD review showed public policy responses across its 43 member and partner countries varied greatly and suggested more insight was needed to place policy adjustments, or the lack of them, within different institutional and sector contexts. The study drawn on here takes forward this call for more contextualised insight. It takes a selective approach looking at public policy adjustments in six OECD member states—Germany, Greece, Iceland, New Zealand, Switzerland and the United Kingdom. Each of the selected country case studies had policy responses in place from (diverse) ministries and publicly funded bodies aimed at addressing tourism workforce skills needs in the digital domain. The paper considers the approaches taken across these countries and evaluates their scope, relevance and early evidence of likely efficacy. It begins, however, by reviewing the literature relevant to technology and tourism labour markets.

## 2 | LITERATURE REVIEW

### 2.1 | Digital technology and the tourism workforce

Several commentators have suggested that digital technologies challenge the essence of hospitality and tourism experiences by blurring the boundaries between human-value and technological services (Choi, Choi, et al., 2020; Choi, Oh, et al., 2021). The de-personalisation of engagement via service robots in hotels, self-service bag drops, and the use of chatbots as a business communication tool, for example, clearly diminish personal and often personalised interaction (Roy & Naidoo, 2021; Tuomi et al., 2020). By contrast, a study of Bulgarian hotel managers found positive dispositions towards the use of robots for codifiable and repetitive tasks (Ivanov et al., 2020).

There is also a strand of the literature where wider concerns are expressed, notably at the replacement of people with machines (Navío-Marcoa et al., 2018:467). It is not surprising, perhaps, that the anticipation of growing precarity of employment is fuelled by greater adoption of technologies (Li et al., 2019; Vatan & Dogan, 2021). Thus, Li et al. (2019) found that in China the use of artificial intelligence (AI) and service robots in the workplace significantly increased employee anxiety and, in turn, levels of labour turnover.

Table 1 provides an overview of key studies concerned with developments in digital technologies as they relate to workforce issues. This paper is concerned only with those relating to digital skills.

Contrary to those who anticipated the ‘de-skilling’ of work precipitated by technology (e.g. Braverman, 1998), more recent policy discourses almost universally emphasise consequences for new skill mixes and the need for ‘reskilling’ and ‘upskilling’ to respond to these, particularly in relation to digital skills across the tourism workforce (e.g. Sousa & Rocha, 2019). A failure to keep pace with developments,

it is argued, renders individual businesses and sectors uncompetitive and limits improvements in productivity both within organisations and across value chains (Sigala, 2020). The dynamics operate differently in smaller tourism organisations because of their informality and in various sub-sectors depending upon the intensification of adoption, but lead to similar outcomes (Baum et al., 2020; Thomas et al., 2011).

Three broad categories of digital skills requirements have been identified by commentators: basic computer literacy for everyday life, digital skills for the general workforce, and digital skills for specialised ICT professionals (Innovation & Business Skills Australia, 2010). Although each of these categories is important, most research in this area has focused on the first and last, that is, basic computer literacy and digital skills for ICT workers. Skills descriptions such as ‘computer skills’ or ‘ICT skills’ represent the narrowest and most basic conceptualisation of digital skills in the scholarly literature (Dore et al., 2015).

Workforce consequences of skills change, and the potential for responding to these, raises an important distinction between skill gaps and skill shortages. *Skill gaps* relate to the contrast between the skills needed and those held by people in the existing employed workforce (including casual staff). In other words, these relate only to those already present and active in the tourism workforce. *Skill shortages*, by contrast, relate constrained external skill supply for meeting vacancies arising—or likely to arise—from staff turnover, new job creation or new occupational or skill requirements. These are the skills which recruiters find in persistent short supply among applicants for vacancies and which are often seen to stem from deficient supply of those skills to the external labour market.

**TABLE 1** Digital technologies and the hospitality and tourism workforce (2016–2021)

AI, automation, and service robots	
Service provider: Human staff versus service robot	Choi, Choi, et al. (2020), Ho, et al. (2020); Hou, et al. (2021); Kim, et al. (2021)
Impact of automation and service robots on the role of staff and management leadership	Ivanov et al. (2020); Mingotto, Montaguti, & Tamma, (2020); Tuomi, Tussyadiah, & Stienmetz, (2020); Xu, Stienmetz, & Ashton, (2020)
Staff's perceptions of the use of service robots	Ivanov et al. (2020); Li et al. (2019); Vatan and Dogan (2021)
Challenges in redesigning operations and service environments	Seyitoğlu & Ivanov (2020)
Blockchain	
Application in hospitality and tourism operations	Filimonau & Naumova (2021); Nuryyev et al. (2020); Önder & Gunter (2022); Thees, et al. (2020)
Internet of things (IoT)	
Application in hospitality operations	Mercan et al. (2020)

Note: No research with a workforce focus was found in the areas of big data, VR/AR, cloud computing, or 3D printing.

Policy responses need different emphases when seeking to tackle skills gaps in the existing workforce, where the focus will be on needs-based, adaptive and often flexibly accessed employer-based responses for those in and at work. In contrast, skills shortage responses aim to address external skills supply constraints, where education and initial vocational training providers will have greater prominence in leading curricula and other 'supply' responses to vacancies and prospective skills demand. While a cohesive approach to skills gaps and skills shortages policy responses will aim to be complementary, they will be differently focussed and situated.

Carlisle et al. (2021) provide one of the few recent systematic studies looking at both digital skills gaps and shortages in tourism. Their work drew on evidence derived from a, cross-sectional survey of almost 1700 organisations across five sectors (visitor attractions, tour operators and travel agents, destination management organisations, and providers of food and beverages, and accommodation) located in eight European countries. Although the research was conducted prior to the COVID-19 pandemic, it remains relevant; arguably, it has become more relevant because of the growing number of businesses finding technological answers to the added challenges brought on by this global shock (Sigala, 2020).

Some of Carlisle et al.'s (2021) findings regarding current and future (anticipated) levels of workforce digital skills proficiency are summarised in Figure 1. Respondents were confident using standardised software packages such as MS Office but had little knowledge of AI, virtual reality (VR) and other more advanced technologies (Carlisle et al., 2021). To some extent, anticipated skills were, perhaps, also relatively predictable, with online marketing and communication, social media and MS Office skills scoring highly. These findings probably mirror a concern with the immediate or routine work, which typifies

that undertaken in the small and medium sized enterprises (SMEs) of these sub-sectors (Kim & Shim, 2017). As Carlisle et al. (2021: 9) note:

*Therefore, respondents acknowledge that the level of proficiency needs to be increased for all digital skills. The lowest gaps are found for basic digital skills such as operating system use ... The highest gaps respondents found in advanced digital skills such as 'augmented and virtual reality skills' ... and 'AI and robotics skills' ... (these) two skills are considered as least required in the future for tourism and hospitality companies.*

Sub-sector level analysis revealed a degree of variation, with those operating food and beverage showing least orientation towards the need for digital skills, both in terms of current and future needs. Tour operators and travel agents and DMOs, by contrast, reported digital skills requirements for the future that were far more significant.

The incidence of investment in digital skills training is, potentially, an important indicator of the extent to which organisations in tourism are recognising and responding to transformation opportunities and underpinning needs in this sphere. The evidence provided by Carlisle et al. (2021) suggests that more than a third of those surveyed had not engaged in any training with the remainder almost exclusively involved in on-the-job or online training. Predictably, patterns of training reflected the intensity of technology within that sector. Zaragoza-Saez et al. (2021: 12) in a related study of the Spanish context, offer very similar results. As they conclude:

*The findings show that the future tourism sector will require skills sets, which, in some respects, will be radically*

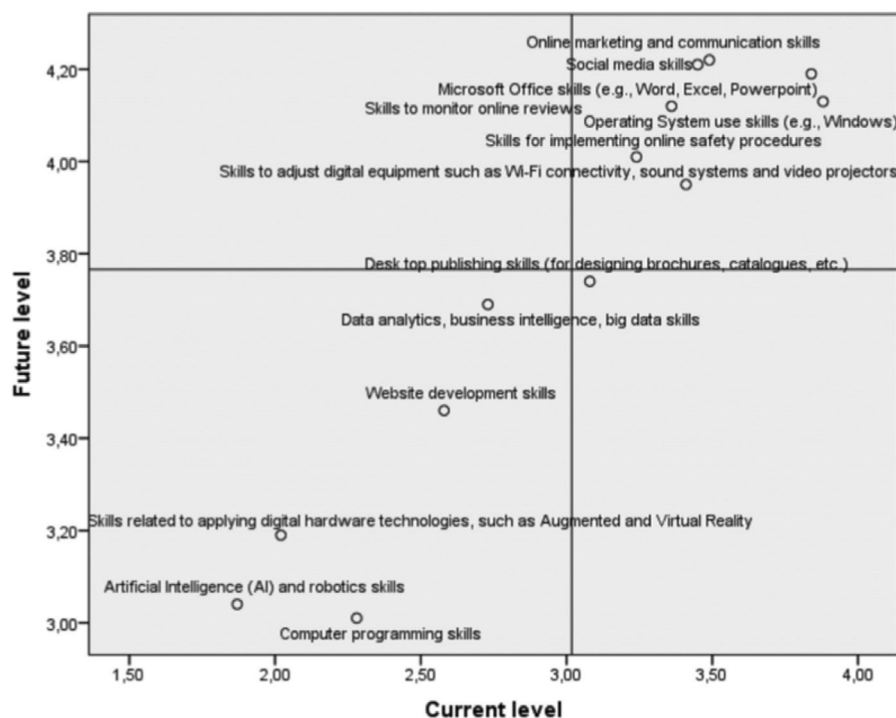


FIGURE 1 Current level-future level digital skills map (Carlisle et al., 2021: 11)

*different from today's, especially in the field of digital skills.... In spite of the constant technological advances, the tourism organisations analysed consider that digital skills are still an unresolved issue.*

Beyond these studies, it is curious that the nature of work and the role digital skills are likely to play in digital transformation for organisational and sectorial development is largely absent from the academic literature.

## 2.2 | Policy response

International agencies concerned with tourism have long recognised the risk presented by digital skills challenges to organisational competitiveness (for a recent example see UNWTO, 2022). Some have projected digital skills shortages and gaps and considered their implications over the short- and medium-term (e.g. OECD, 2021). Others have considered the skills adjustments needed and encouraged wider (cross-sector) approaches to support resilient recovery through digital transitions, notably in Europe through the *European Skills Agenda* of the European Commission (EC, 2022a) and its embedded *Pact for Skills* (EC, 2022b).

Cross-national activity and advocacy such as these have sought to encourage national action to expand the volume of workers with digital skills. Where public sector policymakers have taken an interest in this issue, it is because they recognise that digital skills shortages and gaps may damage whole sectors of national economies or competitiveness. Moreover, such deficiencies may be of greater significance to national or sub-national policymakers if they are seen to risk acting as a brake on post-pandemic recovery or subsequent resilience. While these issues affect many economic sectors, they may be of particular significance to national tourism sectors since the visitor economy has been disproportionately hit by COVID-19, and because of emerging and often chronic labour shortages affecting its recovery.

Until recently, the dominant rational-normative policy discourse inferred an almost dichotomous set of policy choices available to national or local policymakers (e.g. state versus market; collaborative versus hierarchical). This led, in principle at least, to interventions that would typically start from a formal assessment of anticipated skills demand. The findings would then be compared with current and prospective supply, leading to adapted (market or planned) interventions devised to remedy any imbalance (see, for example, Carlisle et al., 2021).

The resurgence of design thinking in policy development has prompted a reframing of policy challenges by some actors in a manner that emphasises the benefits of a more 'open-ended' and creative approach to assessment and intervention. van Buuren et al. (2020) provide a useful contemporary review of three prominent approaches to design thinking in policymaking: design as (bounded) optimisation; design as exploration; design as co-creation. The underlying rationale for each emphasises using knowledge to find the best possible solutions, novelty (drawing on ideas of open innovation), and that

policymaking is a participatory endeavour among those affected (stakeholders), respectively.

Although not as prominent in the tourism literature, the emphasis on integration has led policymakers in some sectors to recognise a set of 'policy mixes' that acknowledges interdependencies. As Schmidt and Sewerin (2019:1) explain '*Policy mixes matter, as many market or system failures ... bottlenecks ... risks and actors are involved ... which cannot be addressed by a single policy*'. This has long been recognised in the tourism literature from, for example, Sessa (1976) to Narduzzo and Volo (2019). The extent to which it has informed the practices of policymakers in tourism remains an open question, and the evidence from this study suggests policy responses in workforce digital skills adaptations in tourism have yet to respond to these interdependencies.

## 3 | METHODS

The study reported in this paper focused on six countries: Germany; Greece; Iceland; New Zealand; Switzerland and the United Kingdom. Country selections were purposive, with each identified by OECD (2021) as taking at least one active policy measure (Table 1). In other words, these countries were not taken to be representative of the wider population but were selected because they intervened actively in digitalisation and tourism; there was little to be gained from studying those that do least. The selection also provided for a range of adjustment experience inside the European Union and outside, by different policy actors, with contrasting tourism intensities for their economies and with varying traditions and processes of public policy engagement in workforce skills development.

A three-phase process of data gathering was undertaken for each of the case studies. For the first, national ministerial representatives with responsibility for tourism had been invited to complete a questionnaire survey. This took place between July and September 2021. Each was asked to engage other policy influencing stakeholders representing tourism sector interests to provide a country perspective drawn across a range of stakeholder views and experiences. All six lead agencies in the case study countries completed the questionnaires, collectively drawing upon material from 43 organisations in total, variously drawn from ministries, and representative bodies for tourism enterprises, employees, education and training providers, and other publicly funded bodies such as national tourism promotion and development agencies.

This first phase collected evidence to provide an overview of the state of play on tourism digitalisation; the main emerging digital technologies in tourism; affected jobs; labour market implications; digital skills challenges, gaps and shortages (employees and managers); any distinctive SME or locality digital skills challenges; governmental-industry-education skills response collaborations in place; policy and adjustment responses in place (and planned); and evidence of policy impact/efficacy evidence and its measurement. It also sought additional supporting sources and materials. This provided for a first phase contextualised national overview of the perceived digital skills

situation and challenges facing the tourism sector and the ensuing national policy responses.

The second phase reviewed the supporting material identified during phase one to gain a more nuanced understanding of the digital skills gaps, shortages and policy responses at national level. Further secondary evidence was collated from other national sources, a wider literature review and from criteria-based web searches. Data and documentation drawn from this intensified evidence gathering were examined, and evidence gaps and clarifications identified.

The third phase involved two-stage interviews with a range of key informants, with a particular focus on the evidence gaps emerging at national level from phase 2. Policymakers in lead governmental tourism bodies were interviewed first, followed by key informants identified from those interviews or from the phase 2 documentary review. A total of 24 organisations (and 36 individuals) across the six cases contributed to this phase of the study.

Fourteen of the third phase organisations were ministries, government agencies, non-departmental public bodies or other publicly funded bodies; eight were tourism sector or employer representative bodies, and two were curriculum and standards setting bodies directly engaged in reviewing relevant policy measures. The third phase interview selections reflected clarification needs and the different national policy infrastructure for tourism and related workforce issues. Interviews were conducted virtually to accommodate the pandemic travel restrictions that existed at the time. Interviews were semi-structured which accommodated the need to clarify some issues that were pertinent to particular countries. Interviews took place between late February and early April 2021.

Data analysis was progressive across the three phases with an instrumental focus on policy adjustment and implemented actions aimed at addressing digital skills challenges perceived to be affecting the sector. The analysis focus of phase three used a deliberative review framework through interviews focussed on exploring stakeholder insights relating to the phase two gaps and clarifications. Following phase three, evidence was drawn together into comparative country narrative case studies prior to undertaking a thematic cross-country analysis. Individual country cases were verified in June 2021 for factual accuracy with lead country contacts, each of which were the main ministries or delegated agencies. All interviews were conducted in English apart from some in Greece, which were undertaken in Greek and translated. Full ethical approval was secured from Leeds Beckett University prior to undertaking the project.

Determining the utility of policy responses is challenging in an international context. The application, or arguably imposition, of apparently neutral review frameworks suffers from an insensitivity to the political and social contexts within which policy operates (Parsons, 2017). For this study, the inductive approach as outlined enabled an assessment of the quality (utility) of responsiveness to be considered against the coherence of the self-identified policy challenges, the self-declared goals, and evidence of any evaluations of adjustment policies or programmes. The comparative design and considerable overlap between case contexts enabled meaningful cross-case and thematic analysis.

## 4 | FINDINGS

### 4.1 | Digital skills and data deficiencies

One of the most striking findings from this study is the poor quality of sector-specific national evidence available to tourism policymakers in several of the countries studied. Policy responses in five relied on broadly based tourism workforce data with any specific content on digital skills supply and demand coming from largely informal liaison or insight from trade or industry groupings, sometimes mediated through DMOs. Where policy responses on current workforce digital skills gaps were said by policy-leads to have been evidence-based, the supporting intelligence was found usually to be limited to largely anecdotal information, often from a small number of contributors.

Existing workforce intelligence mechanisms such as sector surveys or barometers, as in Greece, New Zealand and the UK were often conducted with a focus or frequency, which was slow to pick up on specific emerging skills needs such as digital transformations. Only in Germany was there up to date, systematic, and sector specific evidence on digital skills issues. This was drawn from a specific federal initiative adding additional questioning in 2020 and again in 2021 to a regular online panel survey of the sector by the Federal Competence Centre for Tourism.

Other than in Germany, policy makers' insight into digital skills gaps and shortages in tourism appeared to rely heavily on anecdotal evidence. This was often mediated through stakeholder observation or information from managers, who may themselves have lacked the understanding with which to identify and describe digital skill requirements from different adoption approaches or to differentiate between digital skills gaps and shortages. It was also clear that such contributions were most likely to be drawn either from larger tourism enterprises or representative bodies and may have lacked insight into the challenges facing smaller tourism businesses.

Key informants in all case study countries indicated that there were significant digital skills deficiencies among existing employees, which stemmed from long standing under-investment, especially in SMEs. UK participants, for example, pointed to low margins for such firms, constraining spending on off-the-job skills training; this was compounded by a reluctance to invest where there were high densities of casual or seasonal staff or where staff turnover was high.

The analysis showed many transforming businesses had a tradition of 'on-the-job' training, undertaken informally and usually by more experienced staff. This legacy was likely to impair digital skills adjustments in situations where managers and other employees themselves lacked the digital confidence, understanding or proficiency to impart relevant skills. Where tourism SMEs were very small family run businesses, as for example in rural Iceland, New Zealand, Switzerland and island communities in Greece, the knowledge pool for informal training was likely to be even weaker.

Three of the case study countries—Iceland, New Zealand and Switzerland – claimed that raising managers' digital skills and knowledge was a policy priority and a gateway to addressing wider

skills gaps in the tourism workforce. For Greece, there tended to be greater emphasis on employee, rather than managerial, digital skill development.

Evidential deficiencies to inform policy action and adjustment applied also to skills shortages. Among the case study countries, only in Germany was there quantitative evidence of future digital skills shortages for tourism. This showed the challenges of attracting personnel to the sector and a widespread shortage of skilled staff was exacerbated by demands for hybridised skills where staff needed to combine traditional customer facing skills with confident use of digital ordering, payment, customer relationship management and other software and systems. Although lacking comparable quantified data, a similar concern with poor recruitment to the sector applied very conspicuously in parts of Switzerland. There, the well documented labour shortage is a long-standing problem and largely attributed to low wages, irregular working hours, seasonality, and high levels of job insecurity. These may be familiar labour supply issues in many countries, but the generally 'tight' labour market in Switzerland where there are substantial alternative job options, exacerbates the problem for employers.

Where coherent assessments of digital skills shortages in the context of tourism were offered, notably in Greece and New Zealand, the quality of the evidential base remained weak. Cross-sectional surveys were the most common method used, regardless of their attendant limitations (Woodside, 2011). With the partial exception of Germany, the picture on skills shortages affecting digitalisation in tourism remains obscure. This confirms what was suggested by the review of the literature; in even the most helpful studies, data usually originated from cross-sectional studies with sampling that was either very small in scale or did not adequately reflect the diversity of the sector. This means that the available evidence is insufficient for even the most engaged of policymakers.

## 4.2 | Current policy responses to digitalisation skills constraints

Policy makers may have lacked underpinning evidence of digital skills demands (and supply) but this has not held back the development of some policy responses. This study found 28 separate public policy initiatives related to skills and the digital transformation of tourism, summarised in Tables 2 and 3. These was considerable diversity in the responses and a comparative assessment of policy documentation for each by their scope, targeted activity, enterprise or sector focus led to defining five categories of activity.

The first category of activity was comprised of a small number of actions specifically focussed on intelligence gathering linked to current or emerging skills shortages or gaps in tourism associated with digitalisation. Secondly, those to support digital technology uptake, transformation or innovation in tourism enterprises. Thirdly, those designed to support tourism enterprises focused on skills adjustment for digitalisation in the existing workforce (skills gaps). This included actions centred on education provider or employer capacity building

aimed at boosting continuing vocational education and training (CVET) of tourism employees supporting the digital skills pipeline.

A fourth category of activity was associated with adjustments to initial vocational education and training (IVET) systems to address current or prospective skills shortages for prospective entrants to the sector through enhanced digitalisation curricula or course provision. Finally, there were a small number of responses specifically geared to support digitalisation in tourism SMEs.

Interviews with policy leads and engaged stakeholders suggested that the diversity of the programmes listed in Table 2 across the six case countries stemmed in part from different policy stimuli and influencing processes. They variously prioritised aspects of technology awareness and uptake, the adjustment needs and potential of the existing workforce (skills gaps) or redressed current or prospective deficient skills supply (skills shortages). These contrasts in emerging national priorities also meant they varied in scope (sector, locality or type of enterprise supported or targeted) and focus (managers, existing employees, students and prospective employees).

Distinctive policy-making architecture and institutional arrangements also appeared to play a role and meant the identified actions were offered by a plethora of agencies. The predominant (20) adjustment actions were offered at national level and usually directly by funding support from specific ministries (12) such as in Germany with its *Performance Improvement and Innovation Promotion in Tourism* (LIFT) programme led and funded by the Federal Ministry for Economics and Energy and focussed on raising digital utilisation and workforce skills in businesses. Cross-ministry or multi-agency actions (8) saw (usually) public bodies working in collaboration, such as Iceland's SME-focussed *Tourism Digitalisation Awareness* programme bringing together the Iceland Tourist Board, the Department of Tourism and Innovation and DMOs to subsidise a 'road show' style programme of digitalisation awareness courses across Iceland.

Publicly funded actions were commonly led by the funding ministry or agency but in several cases (6) were devolved. For example, New Zealand's *Digital Capability Support* was funded by the Ministry of Business, Innovation and Employment to boost tourism recovery by lifting digital capability, had its delivery delegated to Qualmark, the tourism quality rating body in New Zealand. In Greece, the *Grow Greek Tourism Online* was funded by the Ministry of Tourism to provide a platform of *generic* online courses and a pathway into customised digital skills training through a commercial partner, Google.

Some digital transformation policy responses were specific to particular localities such as the long established (since 2013) *Mia Engiadina* initiative in Switzerland. Although largely funded at federal government level, its focus on tourism digital capability and infrastructure building was centred on a single remoter Canton in a rural area highly dependent on tourism revenue. Others might have their focus limited to digital transformation of specific tourism sub-sectors and notably the Ministry of Tourism funded action for DMOs in Greece to support digitization of the internal operation of the 14 Regional Tourism Organisations.

Two actions crossed national boundaries. The *Next Tourism Generation (NTG) Alliance* was funded by the European Commission to

TABLE 2 Policy action summary from the case study countries, 2020–2021

Focus	Focus or priority of policy response <sup>a,b</sup>	Identification of current/emerging skills shortages or gaps from digitalisation	Grant/loan or other publicly funded support to digital uptake, transformation or innovation	Skills adjustment support for digitalisation to the existing workforce	Enhanced digitalisation curricula in initial vocational education and training systems	Uptake and skills adjustment support for digitalisation specifically targeted at SMEs	Other related adjustments n.e.c.
Greece	Tourism specific action Multi-sector action open to tourism firms	-	1 cross-national action (ltd. to 14 DMOs)	1 cross-national action 1 all-sector action	-	1 action on tourism 'digital marketing'	-
Germany	Tourism specific action	D/'t 'panel' survey on uptake/skills needs (2019 & 2020)	1 federal funded action	1 federal funded action	-	1 targeted action	1 action (all 'Lander' delivered Federal funding)
	Multi-sector action open to tourism firms	-	-	2 all sector national actions	-	-	-
Iceland	Tourism specific action Multi-sector action open to tourism firms	-	-	1 joint-action (across 3 Nordic co's)	-	3 separate 'rural' tourism actions	-
	Tourism specific action Multi-sector action open to tourism firms	-	2 all-NZ tourism enterprise action	1 tourism action (manager centred)	-	-	1 action
	Tourism specific action Multi-sector action open to tourism firms	-	-	-	-	-	-
Switzerland	Tourism specific action Multi-sector action open to tourism firms	-	2 separate actions (1 DMO centred)	1 sub-regional action	1 hospitality specific action	-	1 hospitality specific action 1 all-sector action
	Tourism specific action Multi-sector action open to tourism firms	-	1 national action	1 national toolkit roll-out	-	-	1 national action

<sup>a</sup>Policy actions which were focussed on tourism enterprises (nationally defined) or tourism skills provision but where some actions may have been limited to specific activities within this sector.

<sup>b</sup>Policy actions identified in phase 3 interviews where tourism enterprises or tourism skills providers had access alongside firms from other eligible sectors. This excludes other multiple sector actions where tourism enterprises were ineligible.



TABLE 3 Identified policy actions from the case study countries (2021)

Focus	Originating institution(s)	Policy action	Scope/coverage
Greece	Ministry of Tourism Ministry of Tourism Ministry of Digital Governance Hellenic Chamber of Hotels launched	Grow <i>Greek Tourism Online of generic</i> online and customised digital skills training through Google Digitization enhancement programme for 14 Greek Regional Tourism Organisations Digital Transformation 'Bible' of Greece' (2020–2025) digitally systematise intelligence on digital rejuvenation <i>CapsuleT</i> 'acceleration' programme on digital marketing and other business optimisation practices.	Tourism specific DMO specific Cross-sector with segment on Greek tourism industry Micro-SMEs in tourism and hospitality
Germany	Federal Competence Centre for Tourism. Federal Ministry for Economics and Energy Federal Ministry of Economic Affairs Federal Ministry for Economics and Energy (and Federal Employment Agency)	Commissioned (online) tourism sector panel survey on digital transformation and skill needs <i>Performance Improvement and Innovation Promotion (LIFT)</i> programme—multi-activity initiative to raise digital utilisation and tourism enterprise-level skills ' <i>Mittelstand-Digital</i> ' and <i>Mittelstand 4.0 Competence Centres</i> ' to raise managers digital awareness and skills <i>Richtiggemacht</i> 2nd phase initiative (launched in 2019) to increase tourism training uptake by young people to take up a training place in tourism.	Tourism specific Tourism specific Cross-sector, smaller firm focussed Tourism centred
Iceland	Ministry of Industries and Innovation Iceland Tourist Board (and DMOs) and Department of Tourism and Innovation Nordic Council of Ministers Tourism Skills Centre, Iceland Tourist Board and Department of Tourism and Innovation	Establishment of Icelandic <i>Tourism Skills Centre</i> (2017) to raise staff skills—and with a particular focus on digitalisation. <i>Tourism Digitalisation Awareness</i> 'road show' programme of digitalisation awareness introductory courses Tourism enterprise centred <i>Digital Toolbox</i> learning platform (diagnostics, support tools, practice cases, etc) Programme of sub-regional DMO-led geographical digitalisation learning clusters	Cross-sector focus but emphasis on small/rural enterprises Tourism micro and small SME focussed Iceland (& Greenland, Finland and Faroe Is). Managers of micro and small rural tourism businesses
New Zealand	Ministry of Business, Innovation & Employment, and Department of Conservation Ministry of Business, Innovation & Employment Ministry of Business, Innovation & Employment (via International Visitor Levy) Tourism Industry Aotearoa	<i>Digital Capability Support</i> programme led by <i>Qualmark</i> to boost tourism recovery by lifting digital capability Digital Boost programme including funding from the Government's COVID-19 tourism recovery package Go with <i>Tourism</i> initiative (from 2019) using digital platforms to 'digitally competent' people to tourism" TRENZ Hui linking tourism enterprises with international 'buyers' during COVID travel restrictions via an interactive online platform	Tourism specific Cross-sector COVID support with \$5 M ring fenced tourism funding Tourism specific Tourism specific
Switzerland	EHL (Lausanne—via FIT Digital Technological Innovation Foundation) Hotellerie Suisse, selected DMOs, University of Applied Sciences, and Microsoft. Hotellerie Suisse, EHL, Federal Government via Innovation Tourismus, Innotour, Hotel Fachschule Thun (as hospitality booster) Swiss Federal Government; regional DMO & canton government	<i>EHL Foundation for Innovation</i> (2019) supporting rural tourism starts ups with digital solutions <i>Discover Swiss</i> —tourism marketing and business platform with integrated management and workforce digital training <i>Hospitality Booster</i> —a focus for digital innovation and uptake and a community for enterprise innovation. Lab Hotel—open 'demonstrator' hotel (Thun) with an integrated digital capabilities 'research laboratory' (linked to Hospitality Booster) <i>Mia Engradina</i> initiative (2013+) to apply digital innovation a remoter rural sub-region with high tourism dependence	Focused on rural restaurant and hospitality sectors Tourism specific—all Switzerland Open to all tourism sector Hospitality centred Single Swiss Canton; all sector but with strong tourism focus
United Kingdom	Departments for Business Enterprise and Industrial Strategy and Culture Media and Sports, British Tourist Authority Visit England	Enterprise digital skills training in Tourism Zones (part of pre-COVID 'Tourism Sector Deal' withyon UKs Industrial Strategy) <i>Digital Marketing Toolkit</i> —part of a self-development, business advice hub focussed on smaller tourism businesses introducing online marketing	Tourism SMEs located in designated Tourism (development) Zones All sector—nominally 'England' focussed but open access

encompass stakeholders from eight EU countries to review digital skills. The *Digital Toolbox* learning platform funded by the Nordic Council of Ministers drew together Iceland, Greenland, Finland and the Faroe Islands, with plans to widen access to smaller tourism enterprises in all of the Nordic countries.

Most of the identified policy responses were very recent developments. Only four of the 18 actions identified existed prior to 2020, the earliest being the localised *Mia Engiadina* initiative in Switzerland. Three-quarters were tourism specific initiatives, although in some cases relating only to parts of the sector defined by activity (e.g. accommodation, DMOs) or by enterprise size. Others were cross-sector, generally open to all economic sectors although sometime limited to SMEs and here tourism enterprises were able to engage along with those from other sectors. Actions in Germany and New Zealand, in particular, were more likely to be cross-sector, although in New Zealand there was enhanced tourism enterprise access through ring-fenced supplementary funds geared to tourism SME recovery post pandemic.

There was little evidence of coordination where a range of initiating public bodies or partnerships were involved. This presented a picture of largely stand-alone and often fragmented public policy responses especially where, as in the UK, several central ministries (6) had distinctive areas of policy interest in tourism. An exception appeared to be New Zealand where strong ministerial leadership had seen policy coordination across eight ministries and four non departmental public bodies, steered through the Ministry of Business, Innovation and Employment (MBIE) and the Department for Conservation.

The lack of intelligence to inform policy development of digital skills adjustments was compounded across these 28 actions by a piecemeal approach to systematically evaluating what was put in place. In 26 of the responses, there appeared to be no provision for independent evidence of the effectiveness of any of these programmes beyond routine monitoring of take-up. Policy makers were consequently setting up responses largely 'in the dark' and had subsequently made little or no provision for evidence to inform improvement of those policies as they progressed. Clearly, 'an absence of evidence is not evidence of absence' (Altman, 1995: 485) but claims to success are significantly less compelling in the absence of evidence.

The structure of the sector internationally suggests that addressing the needs of SMEs, and especially the limited digital skills and knowledge of managers in smaller tourism enterprises, would be of central concern. Indeed, the research undertaken for this paper confirmed policymaker recognition of the challenges posed to digital transformation by lagging managerial knowledge and skills. Iceland, for example, has two key initiatives in this area, including an evolving programme to bring together geographical learning clusters of very small tourism businesses as well as being a part of a wider Nordic SME manager focussed collaboration for the *digital toolbox* outlined above.

Similarly, Germany has developed the '*Mittelstand-Digital*' (SME digital) initiative led by the Federal Ministry of Economic Affairs and geared to managers, and New Zealand's *Digital Boost* programme supplemented by a tourism specific *Digital Capability Support* programme

outlined above is centred on managers struggling to operate new technology. However, in Greece, although SMEs were targeted, the focus was mainly on basic employee development rather than on securing the interest of managers or owner-managers who are far more likely to drive innovation. Again, there is little rigorous evidence of the efficacy of these programmes available.

### 4.3 | Policy inertia and development gaps

The six case study countries reported in this paper are more engaged than the majority of OECD countries, where there has been little or no public policy development with respect to digital transformation in tourism (OECD, 2021). Nonetheless, each of the six has witnessed a degree of policy inertia or constraints to effective policy development from which others might learn. The analysis of case studies revealed four common areas of concern: weak intelligence on digitalisation and associated skills needs; the negative impact of COVID-19; fragmentation of public policy leadership weakening integrated actions for tourism; weak technology infrastructure in tourism intensive localities. Each will be discussed briefly below.

First, it is evident from both policy-related documents and interviews with the actors that there is insufficient data available for approaches to underpin systematic evidence-led approaches to policy development. Even in countries such as Germany, where there have been structured attempts to establish or optimise tourism labour market intelligence, they appear to be insufficiently rigorous. In others, there appears to be a lack of ambition to address this evidence constraint. In Greece, for example, the adoption of the 'Digital Transformation 'Bible' of Greece' (2020–2025) established by the Ministry of Digital Governance aims to digitally systematise sector intelligence to support the digital rejuvenation of the Greek tourism product and industry but its scope is partial. As has been noted, policy responses seem to rely on, at best, largely anecdotal information which lacks an appreciation of the diversity of digital skills needs (and mixes) likely to affect different types of tourism businesses. Thus, approaches to intelligence gathering fails to pursue specific digitalisation skills issues with credibility.

This is not to diminish the challenges associated with collecting robust skills and workforce demand evidence in tourism contexts. International classifications of economic activity (and occupational data) diminish the utility of available (national) secondary data classified on this basis and comparative (time series or international) benchmark data. Direct approaches to collecting such labour market intelligence at sufficient scale and from tourism enterprises is costly and slow and can encounter challenges in SME engagement.

The deficiencies of data for policy development are not compensated for by detailed and systematic evaluation of digitalisation support initiatives. Of the 62 policy actions identified in the OECD (2021) study, fewer than one in five (19%) appeared to have embedded a systematic approach to evaluating their effects and effectiveness. While there was a wider aspiration to conduct evaluation, the study concluded: "When considered together, the evidence suggests a wide recognition of the value

of impact evaluation (and monitoring) of digitalisation policy developments, but as yet little practice to draw on ...” (OECD, 2021; 50). The six cases examined for this study corroborate such a perspective.

Any resurgence of design thinking in public policy development was not evident from this study. The notion of reframing policy challenges in a manner that emphasises the benefits of a more ‘open-ended’ and creative approach to assessment and intervention was not found among the key informants interviewed. None of the characteristics of the three design approaches discussed earlier (i.e. design as optimisation, design as exploration or design as co-creation) (van Buuren et al., 2020) were present when policy rationales for digitalisation of tourism was explored.

The second prominent finding is that COVID-19 appears to have impacted negatively on tourism policymakers’ level of activity in the context of digitalisation in many, but not all, instances. Key informants suggested that where policy deliberations were underway pre-COVID, this was often halted because of the urgency and scale of other critical public policy priorities aimed at public health and safety in the pandemic. In some cases, pressure on public finances from pandemic responses were said to have resulted in ‘de-prioritising’ previously planned digitalisation actions for, or likely to benefit, tourism. This is somewhat paradoxical at a time when many commercial organisations in the tourism sector were gravitating towards digital solutions to urgent business challenges caused by the pandemic. It is important to contrast this with other instances where, such as in New Zealand, the pandemic led to a revitalization of interest in digitalisation and tourism, and where the (uncommon) quality of cross-ministerial coordination enabled this.

The fragmentation of policymaker leadership to support digitalisation in tourism represents the third prominent finding. As the literature review demonstrated, the emphasis on integration has led policymakers in some sectors to recognise explicitly a set of ‘policy mixes’ that acknowledges various interdependencies. Other than in New Zealand, there was little evidence of such integration reflected in tourism policy making for the case study countries, especially relating to capability building issues such as for skills or work organisation. Thus, in Germany, federal and state level activities are developed and operate independently. In the UK, six different ministries have a policy interest in specific aspects of tourism, alongside devolved government interests in Northern Ireland, Scotland and Wales. In Switzerland the system of highly autonomous regional government (where Cantons vary in size from 20,000 inhabitants to 1.5 million) adds complexity to initiatives in that county.

In Greece, fragmentation is evident from a review of the actions of various stakeholders to address sectorial needs. The numerous seminars and training opportunities provided by, for example, The Ministry of Tourism, The Hellenic Chamber of Hotels and The Organisation for Labour Force Employment, illustrates this observation. A consequence of this fragmentation is that there are no data about the total number of participating employees nor any consistent measure on the effectiveness of the training or unmet demand.

It would be misleading to suggest that policy co-ordination was not recognised. In New Zealand, greater integration was stimulated by

establishing the Ministry of Business, Innovation and Employment (MBIE) to coordinate tourism policy and this was intensified by the leadership provided by the Minister of Tourism also holding the government’s ministerial briefs for SMEs and for Regional and Economic Development. Elsewhere it appeared that digitalisation and digital skills raised competing policy ambitions across these coordinating mechanisms with the apparent result that policy actions were confined to specific ministerial domains such as innovation, technology development, or skills enhancement.

The fourth prominent finding from this study found a concern among stakeholders that weak infrastructure hindered digital transformation in tourism. This was seen as a brake on digitalisation policy implementation for tourism intensive localities such as rural areas, coastal destinations or island communities where digital, and especially broadband or mobile telephony infrastructure was poor. In the case of the Engadin region in Switzerland, there was an explicit realisation that the tourism sector alone could not change the infrastructure. For policy makers, this presented a response dilemma that any actions to boost digital capabilities of tourism businesses would be ineffective or inequitable across the sector without the infrastructure in place to support its roll out. This had a particular consequence for digital skills training where the nature of the way work was organised required flexibility enabled by fully on-line provision or blended learning. Without the digital infrastructure, access to such mechanisms for skills enhancement were set to have limited take-up.

#### 4.4 | Future orientations

Digitalisation has been a disruptive technology for tourism. Organisational responses have varied, with adoption prevalent in some sub-sectors, notably travel, but slow in smaller firms operating in food and beverage, DMOs and tourism guides. Similar differentiation exists between different enterprise types and destinations. The pace of digitalisation and the opportunities presented in tourism show few signs of diminishing and have probably been intensified by COVID-19 as tourism business (that have been able to) seek to build resilience and adapt to likely permanent changes in visitor behaviours, expectations and choices.

By highlighting the deficiencies of public policy to support digitalisation in tourism via skills development, the case studies also imply areas for improvement. If public policy is to develop more effectively, it is likely to be in those countries where existing policy structures such as national tourism strategies are in place and have sufficient flexibility to absorb and better integrate additional capacity building actions centred on digitalisation. Moreover, policy development will be aided where foundations already exist for effective and integrated *all government* and cross-ministry collaboration and with social partners and/or wider cross stakeholder commitment. Starting points have been stronger where there is a clear and committed public body (as in New Zealand) or perhaps industry leadership (as in Iceland) for building responsive actions and for unlocking necessary resourcing and financing instruments.

The distinctiveness of tourism digitalisation challenges also needs to be recognised if effective policy is likely to emerge in future. Although probably perceptual, cross-sector initiatives undoubtedly contribute to the weak engagement with support provision among tourism businesses in the case countries. The large numbers of widely dispersed and often very small tourism operators militate against general approaches to business support. The identity of owner-managed businesses is constructed mainly around destinations or in relation to the social capital they enjoy among similar businesses (Kim & Shim, 2017). This is not to suggest that cross-sector actions cannot work but distinctive marketing approaches, as a minimum, are likely to be necessary to reach change averse organisations. Such measures probably also call for a clear, coherent and harmonious voice across the sector, most likely through engaging closely with industry associations. Destination Management Organisations can play an important role in marshalling such marketing as in Iceland and in Greece.

The research reported in this paper sought to distinguish between the challenges presented to digital transformation by skills gaps and skills shortages. Policy action is needed to address these distinctive issues separately for 'internal' and 'external' labour markets, and through the prism(s) of continuing vocational education and training (CVET) and initial vocational education and training (IVET). The anecdotal evidence suggests a degree of urgency emerging for harnessing CVET responses to address current workforce skills and knowledge gaps. In its absence, digital transformation in enterprises will at best be sub-optimal and, at worst, may intensify accelerating challenges to workforce recruitment, retention and productivity. IVET presents equally important challenges and is, arguably, vital to meeting the longer-term digital skills need of the sector but cannot be undertaken effectively without improved labour market data.

## 5 | CONCLUSION

Public policy responses to digital transformation in tourism are not widespread, at least not in OECD countries (OECD, 2021). The range of actions identified by the detailed case studies of six countries reported in this paper should, therefore, be recognised as atypical and more forward thinking than for many countries. Nonetheless, the quality of policy innovation in each of these countries remains constrained. Even among developed economies where tourism is a structurally important part of the economy, the actions undertaken generally lack cohesion and are commonly fragmented, not long established and often small in scale.

Although details varied depending upon the individual political and economic circumstances and traditions of each country, there was a remarkable amount of similarity of key dimensions. Perhaps most conspicuous among these was the poor quality of national data on emerging skills needs commonly available to tourism policymakers. There was great reliance on often sporadic (weak) cross-sectional studies or anecdote. Little or no account was taken of any evidence of digital skills adaptation from other sectors. The limitation this places

on effective policy-making, especially when accompanied by little or no rigorous evaluation of specific interventions, is self-evident.

Deficiencies of data were compounded by weaknesses in how policies for digital transformation in tourism were conceived and implemented. Each country revealed an array of actors, often with conflicting agenda, intervening to influence business behaviour in a manner that lacked the coherence and integration advocated in the policymaking literature. Many of the policy responses, moreover, were not targeted specifically at tourism businesses, causing a particular impediment for skills adjustment support reaching tourism SMEs who were characteristically the most lagging in digitalisation uptake, understanding or capacity to transform. Ineffective institutional structures, fragmented funding regimes and poor infrastructure also collide to limit digital progress.

The research has shown that a combination of factors is leading to widespread policy inertia which will increasingly constrain digital transformation in tourism. At present, those mainly larger or digital conversant entrant organisations (and sub-sectors) that can overcome market failures are set to do so. The remaining population, comprised of mainly SMEs which are often longer established and commonly the bedrock of local visitor economies, are—in effect—left to flounder. Addressing some of the key barriers to effective policy development identified in this paper offers the prospect of sharing the potential gains of the forthcoming digital transformation more evenly. It may also make a contribution to post-pandemic recovery and a strengthening of business resilience in an increasingly digital world.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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## REFERENCES

- Altman, D. J. (1995). Statistics notes: Absence of evidence is not evidence of absence. *British Medical Journal*, 311, 485.
- Assaf, A. G., & Tsionas, M. (2018). The estimation and decomposition of tourism productivity. *Tourism Management*, 65, 131–142.
- Baum, T., Mooney, S. K., Robinson, R. N., & Solnet, D. (2020). COVID-19's impact on the hospitality workforce—New crisis or amplification of the norm? *International Journal of Contemporary Hospitality Management*, 32(9), 2813–2829.
- Baum, T., & Szivas, E. (2008). HRD in tourism: A role for government? *Tourism Management*, 29(4), 783–794.
- Braverman, H. (1998). *Labor and monopoly capital: The degradation of work in the twentieth century* (2nd ed.). Monthly Review Press.
- Buhalis, D. (2003). *eTourism: Information technology for strategic tourism management*. Pearson Education.
- Buhalis, D., Harwood, T., Bogicevic, V., Viglia, G., Beldona, S., & Hofacker, C. (2019). Technological disruptions in services: Lessons from tourism and hospitality. *Journal of Service Management*, 30(4), 484–506.
- Carlisle, S., Ivanov, S., & Dijkmans, C. (2021). The digital skills divide: Evidence from the European tourism industry. *Journal of Tourism Futures*. <https://doi.org/10.1108/JTF-07-2020-0114>

- Choi, Y., Choi, M., Oh, M., & Kim, S. (2020). Service robots in hotels: Understanding the service quality perceptions of human-robot interaction. *Journal of Hospitality Marketing & Management*, 29(6), 613–635.
- Choi, Y., Oh, M., Choi, M., & Kim, S. (2021). Exploring the influence of culture on tourist experiences with robots in service delivery environment. *Current Issues in Tourism*, 24(5), 717–733.
- Choy, D. J. L. (1991). Tourism planning: The case for 'market failure'. *Tourism Management*, 21(4), 313–330.
- Dore, L., Geraghty, A. & O'Riordan, G. (2015). Towards a national digital skills framework for Irish higher education: Review and comparison of existing frameworks and models. <https://www.teachingandlearning.ie/wpcontent/uploads/2016/10/DSFramework2015.pdf>
- European Commission (EC) (2022a). European Skills Agenda—Employment, Social Affairs & Inclusion. European Commission (europa.eu). <https://ec.europa.eu/social/main.jsp?catId=1223&langId=en>
- European Commission (EC) (2022b). Pact for Skills—Employment, Social Affairs & Inclusion, European Commission. <https://ec.europa.eu/social/main.jsp?catId=1517&langId=en>
- Filimonau, V., & Naumova, E. (2021). The blockchain technology and the scope of its application in hospitality operations. *International Journal of Hospitality Management*, 87, 102383.
- Ho, T. H., Tobjib, D., & Tsarenko, Y. (2020). Human staff vs. service robot vs. fellow customer: Does it matter who helps your customer following a service failure incident? *International Journal of Hospitality Management*, 87, 102501.
- Hou, Y., Zhang, K., & Li, G. (2021). Service robots or human staff: How social crowding shapes tourist preferences. *Tourism Management*, 83, 104242.
- Ivanov, S., Seyitoğlu, F., & Markova, M. (2020). Hotel managers' perceptions towards the use of robots: A mixed-methods approach. *Information Technology & Tourism*, 22(4), 505–535.
- Kim, N., & Shim, C. (2017). Social capital, knowledge sharing and innovation of small- and medium-sized enterprises in a tourism cluster. *International Journal of Contemporary Hospitality Management*, 30(6), 2417–2437.
- Kim, S., Kim, J., Badu-Baiden, F., Giroux, M., & Choi, Y. (2021). Preference for robot service or human service in hotels? Impacts of the COVID-19 pandemic. *International Journal of Hospitality Management*, 93, 102795.
- Law, R., Leung, D., & Chan, I. C. C. (2020). Progression and development of information and communication technology research in hospitality and tourism: A state-of-the-art review. *International Journal of Contemporary Hospitality Management*, 32(2), 511–534.
- Li, J. J., Bonn, M. A., & Ye, B. H. (2019). Hotel employee's artificial intelligence and robotics awareness and its impact on turnover intention: The moderating roles of perceived organizational support and competitive psychological climate. *Tourism Management*, 73, 172–181.
- Morrar, R., Arman, H., & Mousa, S. (2017). The fourth industrial revolution (industry 4.0): A social innovation perspective. *Technology Innovation Management Review*, 7(11), 12–20.
- Narduzzo, A., & Volo, S. (2019). Tourism innovation: When interdependencies matter. *Current Issues in Tourism*, 21(7), 735–741.
- Navío-Marco, J., Ruiz-Gómez, L. M., & Sevilla-Sevilla, C. (2018). Progress in information technology and tourism management: 30 years on and 20 years after the internet—Revisiting Buhalis & Law's landmark study about eTourism. *Tourism Management*, 69, 460–470.
- Nuryyev, G., Wang, Y.-P., Achyldurdyeva, J., Jaw, B.-S., Yeh, Y.-S., Lin, H.-S., & Wu, L.-F. (2020). Blockchain technology adoption behavior and sustainability of the business in tourism and hospitality SMEs: An empirical study. *Sustainability*, 12(3), 1256. <https://doi.org/10.3390/su12031256>
- Onder, I., & Gunter, U. (2022). Blockchain: Is it the future for the tourism and hospitality industry? *Tourism Economics*, 28(2), 291–299.
- Organisation for Economic Cooperation and Development (OECD). (2021). *Preparing the tourism workforce for a digital future in the era of COVID-19*. OECD.
- Parsons, D. (2017). *Demystifying evaluation: Practical approaches for researchers and users*. Policy Press.
- Roy, R., & Naidoo, V. (2021). Enhancing chatbot effectiveness: The role of anthropomorphic conversational styles and time orientation. *Journal of Business Research*, 126, 23–34.
- Schmidt, T. S., & Sewerin, S. (2019). Measuring the temporal dynamics of policy mixes—An empirical analysis of renewable energy policy mixes' balance and design features in nine countries. *Research Policy*, 48(10), 103557.
- Schwab, K. (2017). *The fourth industrial revolution*. Penguin Books.
- Sessa, A. (1976). The tourism policy. *Annals of Tourism Research*, 3(5), 234–247.
- Seyitoğlu, F., & Ivanov, S. (2020). A conceptual framework of the service delivery system design for hospitality firms in the (post-)viral world: The role of service robots. *International Journal of Hospitality Management*, 91, 102661.
- Sigala, M. (2020). Tourism and COVID 19: Impacts and implications for advancing and resetting industry and research. *Journal of Business Research*, 117, 312–321.
- Skilton, M., & Hovsepian, F. (2018). *The 4th industrial revolution*. Springer Nature.
- Sousa, M. J., & Rocha, A. (2019). Skills for disruptive digital business. *Journal of Business Research*, 94, 257–263.
- Thees, H., Erschbamer, G., & Pechlaner, H. (2020). The application of blockchain in tourism: use cases in the tourism value system. *European Journal of Tourism Research*, 26, 1–21.
- Thomas, R., Shaw, G., & Page, S. J. (2011). Understanding small firms in tourism: A perspective on research trends and challenges. *Tourism Management*, 32(5), 936–976.
- Tuomi, A., Tussyadiah, L. P., & Stienmetz, J. (2020). Applications and implications of service robots in hospitality. *Cornell Hospitality Quarterly*, 62(2), 232–247.
- Tussyadiah, I. (2020). A review of research into automation in tourism: Launching the annals of tourism research curated collection on artificial intelligence and robotics in tourism. *Annals of Tourism Research*, 81, 102883.
- UNWTO (2022). Launch event of the UNWTO digital futures programme for small and medium-sized enterprises (SMEs). <https://www.unwto.org/events/launching-event-of-the-unwto-digital-futures-programme>
- van Buuren, A., Lewis, J., Guy Peters, B., & Voorberg, W. (2020). Improving public policy and administration: Exploring the potential of design. *Policy & Politics*, 48(1), 3–19.
- Vatan, A., & Dogan, S. (2021). What do hotel employees think about service robots? A qualitative study in Turkey. *Tourism Management Perspectives*, 37, 100775.
- Woodside, A. G. (2011). Responding to the severe limitations of cross-sectional surveys: Commenting on Rong and Wilkinson's perspectives. *Australian Marketing Journal*, 19(3), 153–156.
- Zaragoza-Saez, P., Marco-Lajara, B., & Ubeda-Garcia, M. (2021). Digital skills in tourism: A study from the next generation alliance (NGA). *Measuring Business Excellence*, 26, 106–121.

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