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## Article

# Digitalisation and IT Strategy in the Hospitality Industry

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**Abstract:** This article explores how digitalisation is impacting the hospitality industry and assesses the evolving role of an Information Technology (IT) strategy in the digitalisation process. The research approach is qualitative and inductive, based on six in-depth interviews with senior IT professionals in the hospitality industry. Findings indicate significant differences in the role of an IT strategy in guiding digitalisation in the companies studied. The depth of information provided by the interviewees supports the development and application of a model that profiles the companies regarding their degree of digitalisation and technology integration. Analysis of interview material allows the identification of key properties for successful digitalization: process agility, workforce adaptability, and technology manageability, along with a clear data culture and ensured cybersecurity. However, disparate systems and technologies, and a lack of data integrity, are key issues that leave hospitality companies with difficult choices in progressing digitalisation initiatives. The applied model and identification of key properties for successful digitalisation contribute to the development of related theory and can also be used as a reference point for senior IT professionals working in the industry.

**Keywords:** digitalisation; IT strategy; digital transformation; hospitality industry; hotel industry; key properties; technology integration



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## 1. Introduction and Background

The hospitality industry encompasses a wide range of enterprises, varying in size and complexity from large multinational chains and integrated resorts to small independent operators. The uptake and impact of digitalisation in the industry is equally diverse, with some companies having moved swiftly to embrace new technologies, notably at the customer interface, whilst others have been slower to respond [1]. This article explores the deployment of digital technologies in the industry and examines the role of an IT strategy in providing a framework for technology implementation and the associated change processes, using a qualitative inductive approach based on six in-depth interviews with senior professionals working in the industry.

Digitalisation initiatives in the industry have accelerated in recent years in line with technological developments, increased pressure on costs and productivity, and higher customer expectations [2]. Traditionally, IT deployment in hospitality focused on operational support in the form of room management and booking systems, which was subsequently extended to pricing applications, distribution systems, and customer relationship support [3]. In the past decade, the scope of IT applications in the industry has expanded rapidly to encompass process automation as well as more innovative guest experience and touchpoint management applications such as digital twinning, augmented reality (AR) and social media technologies [4,5]. An IT strategy needs to evolve to accommodate the implications of such rapid change [6].

Sheldon [7] was one of the first researchers to explore the application of information technology in the hospitality sector, focusing on front office systems in hotels in the USA, incorporating guest booking systems and room management applications and their impact on

efficiencies. Implications for guest safety and security, and energy management, were also explored. Throughout the 1980s, the first integrated property management system (PMS) software for the hospitality sector came to market, which included not only front office applications but also back-end financial transaction processing and reporting functions [8]. A decade after Sheldon's publication, Poon [9] suggested that information technologies were being rapidly diffused throughout the tourism and hospitality industry and no player would escape the repercussions.

After the turn of the century, the rapid development of mobile apps, the spread of the internet, and cloud applications opened up new possibilities for the hospitality industry to use technology to innovate, enhance the customer experience and drive efficiencies. Law et al. [10] (p. 599) noted that "IT is increasingly becoming critical for the competitive operations of the tourism and hospitality organizations as well as for managing the distribution and marketing of organizations on a global scale". Gyurácz-Németh et al. [11], in their study of innovation in Hungarian hotels, identified the main points of innovation in information technologies as being mobile technology development, the emergence of smart phones, and online hotel booking aimed at improving customer service. Since then, a plethora of other digital technologies have been introduced by hospitality industry operators—artificial intelligence, analytics, robotics, the internet of things, and virtual reality/digital twinning—whilst social media have been widely used as standard communications channels for two decades.

The opportunities afforded by these technologies pose new challenges for IT managers in the industry. Lack of integration with central information systems and data inconsistencies may result from the speedy implementation of digital technologies. In this context, the use of application program interfaces (APIs) and bus layer software—niche software products—as a means of integrating diverse software packages and technologies, has been the focus of considerable recent debate. Both APIs and bus layer software are designed "to provide standardized, transparent software interfaces, to reduce coupling between software modules, and shield the complexity of operating system for synchronous reactive system software design" [12] (p. 469). However, Puerto [8] researched the use of APIs in the integration of hotel information systems and found that "integration is one of the biggest taboos in travel" (para. 14).

There is also the apparent opportunity and business imperative to innovate in response to customer expectations and competitive pressures. Iranmanesh et al. [13] (para. 1) pointed out that "the digital revolution has dramatically changed the operation and management of hotels, and digital technologies have been recognised as the primary sources of efficiency and competitive advantage in the hotel sector". In this techno-managerial environment, strategic choice can be critical to survival. Over 20 years ago, Siguaw et al. [14] highlighted the importance of aligning information technology choices with the strategic objectives of a hotel and suggested that this perception would increase in importance as hospitality executives searched for additional mechanisms to obtain a competitive advantage. This appears even more pertinent today, as the potential of digital innovation must be weighed against the operational restrictions and maintenance overheads of legacy systems and infrastructure.

The terms "digitalisation" and "digital transformation" are much used in the extant literature, although there are no universally agreed definitions of the two concepts. According to Gartner [15], "digitalisation is the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business". Digital transformation is often viewed as being more about formulating new ways of doing business rather than technology implementation. Rogers [16], for example, remarks that "digital transformation is not about technology—it is about strategy and new ways of thinking" (p. 2). Pratt and Sparapani [6] (para. 1), however, define digital transformation as "the incorporation of computer-based technologies into an organization's products, processes and strategies". In reality, the two terms are often used

interchangeably, and this is the case in the interviews quoted in the results section below. No significant difference between the two concepts is assumed or developed here.

More generally, Popadiuk and Choo [17] defined innovation as the development of a new idea and its transformation into a new product, process or service, resulting in the creation of profit for the innovative business. In the context of digitalisation, innovation is often seen as incremental (evolutionary) or radical (disruptive). Chan Kim and Mauborgne [18] (p. 18) note that the challenge is to “use your creative power and the latest technology developments to solve problems or seize opportunities previously seen as out of reach by conventional means and methods”. Accenture [19] concluded that there will be a levelling off of the impact of digital technologies. They suggested that “every company will eventually converge on the same turning point—one where digital-era technology, which began as a differentiating advantage, is something expected from every business. In other words, the digital playing field will eventually even out” (para. 2). They nevertheless maintained that “the coming era will be characterized by massive pressure as customers, employees and society make their demands known. But it will also provide tremendous opportunities for those companies that can deliver the appropriate experience at just the right time” (para. 5).

Tonder et al. [20] recently concluded that “there is no universally accepted, robust conceptual framework that can assist businesses, practitioners and academics to understand the constructs of digitalisation, digital transformation and business model innovation” (p. 112). Nevertheless, a number of models and frameworks provide possible theoretical underpinnings within which to analyse the research findings. Earl’s [21] model of IT strategy development and implementation is still of relevance today. Earl identified three ways in which an IT strategy could be developed—“top-down”, “bottom-up”, and “inside out”. The top-down approach focuses on the analysis of business needs and their translation into information technology requirements; bottom-up is based more on an evaluation of current technology systems and infrastructure to develop technology projects and plans; and inside-out attempts to identify innovative uses and opportunities afforded by new technologies, possibly already in use by competitors or business partners. Although many see his three possible strategies as alternatives, Earl in fact argued that all three can be used in parallel and that different strategies suit different business contexts.

Several authors have tried to identify drivers and/or pillars of digital transformation (DT). Lang [22] put forward a model depicting eight external drivers (compliance; cybersecurity; sustainability; complexity; connectivity; automation; efficiency; agility and flexibility) and four internal pillars (empower employees; transform products; optimise operations; engage customers). Furr et al. [23] similarly suggested four pillars for DT: IT uplift, digitising operations, digital marketing and initiating new ventures. Kumar et al. [24], focusing on key success factors for technology implementation, identified five pillars for DT success: having a digital mindset, having a clear definition of the company’s digital destiny, investing in digital technology capabilities, managing relevant skills and talents, and evolving the organization. Busulwa et al. [25] put forward an “integrative framework” to encompass a wide range of competencies—both technical and strategic—necessary for successful DT in hospitality. Poláková-Kersten et al. [26] conclude that DT is “a process that engenders a qualitatively different organization, where ‘digital’ becomes an intrinsic part of the organization’s value proposition and identity” (p. 3). According to Qin [27], however, this transition involves a number of trade-offs, and the author identified three related paradoxes, namely the paradox of “flexibility and stability of organization structure”, “the paradox of cost and profit”, and the “paradox of perception between executives and employees”.

Bonnet and Westerman [28] identified 15 elements of DT relating to five main change factors: the digital platform, customer experience, operations, employee experience and the business model. Turchi [29] put forward a “digital transformation pyramid” that inter-layered business strategy with corporate execution and enabling technologies to illustrate the multi-faceted nature of DT. More specifically as regards the hospitality industry, Lam

and Law [30] (p. 60), in their study of the readiness of hotels in Asia for DT, concluded that “to meet the changing demands of customers in the experience age and stay ahead of both traditional competitors and industry disruptors in an exponentially-evolving competitive environment. . . hotels (need) the right approach to technology, innovation, supported by the right working culture, be data-focused and customer-centric”. Wynn and Jones [31] developed a quadrant depicting four types of digital enterprise in the hospitality sector: laggard, pioneer, leader and follower, based on the degree of digital technology deployment and level of systems integration, but this model has hitherto not been applied in practice. Thus, although some aspects of digital technology deployment in the hospitality sector, particularly in the context of the “customer journey”, are examined in the recent literature, there is a dearth of studies that examine the intersection of digital technology deployment and the role of IT strategy. In this context, this article addresses two main research questions (RQs):

**RQ1.** *How has digitalisation impacted the hospitality industry and what technologies have been implemented?*

**RQ2.** *What role has IT strategy played in digitalisation in the hospitality industry?*

The article comprises six sections. Following this introduction, the research method is presented. The results section then addresses the two main research questions noted above, and the ensuing discussion section considers some emergent themes and examines implications for theory and practice. The final section summarises the main aspects of the study, considers limitations and points out some future possible areas for follow-up research.

## 2. Research Method

The research methodology is based on an inductive, qualitative approach that assumes an interpretivist philosophy. Gill and Johnson [32] suggest that the inductive approach to research is most appropriate when the researchers’ aim is to explore a topic and develop an explanation of the phenomenon being studied. Mason [33] also concluded that the intensity of qualitative research provides a powerful source of information for analysis.

The main source of data for the study was six in-depth interviews with senior industry practitioners. However, prior to this, a scoping literature review was undertaken to identify key concepts, develop the research questions for the study, reported above in Section 1, and progress the questionnaire design. A scoping review involves a “broad scan of contextual literature” through which “topical relationships, research trends, and complementary capabilities can be discovered” [34] (p. 351). It provides an initial overview of the subject matter “to draw the big picture” [35] (p. 1). Various academic databases, including IEEE Xplore, Google Scholar, and Science Direct were accessed to search for existing literature.

The face-to-face interviews were with professionals involved in digital technology management in the hospitality industry. Four of the interviewees held senior IT management posts at major hospitality companies, and the other two were senior managers in third-party IT providers to the hospitality industry. The companies for which the interviewees worked are anonymized. Four are major hospitality companies—three of which own and operate a wide spectrum of services and outlets from lodging to entertainment to hospitality education. The other two are IT provider companies to the hospitality industry (Table 1). The authors felt that the depth of experience of these senior IT professionals (gained not just in their current posts, but also in other roles in hospitality) would provide valuable insights that would support valid responses to the research questions. The interviews were semi-structured, having the characteristics of both structured and unstructured interviews [36,37]. Semi-structured interviews were adjudged to be the most appropriate means of obtaining qualitative data with the highest possible level of knowledge being acquired in a flexible manner. As the interview progresses, the interviewee obtains the

opportunity to elaborate or provide more relevant information as appropriate [38]. Stockhinger and Teubner [39] concluded that the more intangible, not-so-obvious factors were most effectively identified through semi-structured interviews, allowing the respondents to reflect on their own experience, thereby giving them a “voice” in the study [40].

**Table 1.** Interviewees from the six organisations in the study.

Company	Interviewee	Description
HO1	H1	IT leader of an S&P500 global gaming and entertainment company with over 30 hotel and gaming destinations globally that has been recognized as one of FORTUNE® Magazine’s World’s Most Admired Companies.
HO2	H2	Former IT leader of a large regional entertainment group that develops and operates hotels and integrated resorts in two continents.
HO3	H3	IT leader of a hospitality conglomerate with over 300 properties in 14 countries worldwide whose operations encompass hotels, resorts, luxury villas, food and beverage, food production, education, on-demand hospitality services and property development.
HO4	H4	IT leader of a pureplay hotel development and operations company that owns and/or manages close to 50 hotels, resorts and serviced suites in 31 cities globally.
PO1	P1	Senior director of one of the largest technology solution providers to the hospitality industry globally.
PO2	P2	Founder of an international consulting company that provides technology and business consultancy in lodging and hospitality space to global customers.

The interviews were based around nine questions concerning company background, digital technologies used, the nature of IT strategy and digital change processes, and ten summary statements with which the interviewees were asked to agree or disagree on a 5-point Likert scale. The question directly related to digital technology deployment was structured around the nine “technologies” represented by the acronyms SMAC and BRAID [41] which are evident in much of the related literature. The nine questions and ten summary statements were contained in a questionnaire sent out to interviewees prior to the interviews in the period December 2022 to March 2023. This process was deemed appropriate for exploratory research aimed at gaining insights into relationships and trends in IT and DT, rather than a systematic investigation to prove theory. The authors took the view that six in-depth interviews with experienced senior practitioners, from diverse backgrounds, were enough to allow the development of new material to address the research questions. This is supported by Guest et al. [42] (p. 59), who found that “saturation occurred within the first twelve interviews”, but that “basic elements for metathemes were present as early as six interviews”. All interviews took a minimum of one hour and some went beyond the two-hour mark. The quotations contained in the sections below are taken from the questionnaire and appended notes added in the interviews, which were recorded and subsequently searched for additional relevant material and quotations to address the RQs and identify emerging themes.

For the analysis of the questionnaires and interview transcripts, an online whiteboard was initially used by the two authors to identify potential key themes and explore relationships between concepts. A spreadsheet was then set up to act as a framework for further analysis and development. This technique [43] has been successfully deployed for qualitative analysis in a number of areas, including research into technology transfer [44] and the Sustainable Development Goals at local level [45]. It is a simple technique that aids the researcher in organising and reviewing source material and orientating that material



around research questions. As Walsham [36] has observed, “it is desirable in interpretive studies to preserve a considerable degree of openness to the field data, and a willingness to modify initial assumptions and theories. This results in an iterative process of data collection and analysis, with initial theories being expanded, revised, or abandoned altogether” (p. 76). In this instance, the initial framework was constructed using the six interviewees down the y axis of the framework and using the key concepts taken from the interview design along the x axis—the digital technologies, IT strategy, and the digitalisation/DT process. Responses to the ten summary statements from the questionnaire were also included on the x axis. The framework was populated with data from the questionnaire response and quotations from the interviews. This process took several weeks of detailed study and analysis. Relevant data were then allocated to either RQ1 or RQ2 in the z axis of the framework. At the same time, as key themes emerged, these were recorded on the online whiteboard and cross-referenced with initial analysis and related literature sources. This provided the basis for the development of the results and discussion sections below.

### 3. Results

This section addresses the two main research questions set out in the introduction section.

#### 3.1. RQ1. How Has Digitalisation Impacted the Hospitality Industry and What Technologies Have Been Implemented?

The six interviewees indicated varying perspectives regarding the take-up of digital technologies in the hospitality sector. All six interviewees confirmed that the well-established technologies (social media, cloud computing and mobile) are used within their organisations and across the industry as a whole. Analytics/Big data and IoT were also widely used, with just one hospitality group (HO4) not using these technologies at present. AI and robotics were seen as prevalent in the industry by three of the six respondents, but robotics were evident in only one of the four hotel groups (whilst the two IT providers, taking a cross-industry view, confirmed the use of these technologies in the sector as a whole). Augmented Reality (AR)/Virtual Reality (VR) had been implemented in one of the four hotel groups and was evidenced by one of the IT providers. Blockchain was used by none of the four hotel groups, but one of the two IT providers attested to its deployment more generally in the hospitality sector (Table 2).

**Table 2.** Digital technology deployment perspectives of the six interviewees.

Technology/Company	HO1	HO2	HO3	HO4	PO1	PO2	Total
Social Media	Yes	Yes	Yes	Yes	Yes	Yes	6
Mobile Computing/Apps	Yes	Yes	Yes	Yes	Yes	Yes	6
Cloud Computing	Yes	Yes	Yes	Yes	Yes	Yes	6
Analytics/Big data	Yes	Yes	Yes	No	Yes	Yes	5
Internet of Things	Yes	Yes	Yes	No	Yes	Yes	5
Artificial Intelligence	Yes	Yes	No	No	Yes	No	3
Robotics	No	No	Yes	No	Yes	Yes	3
Augmented Reality/Virtual Reality	Yes	No	No	No	Yes	No	2
Blockchain	No	No	No	No	Yes	No	1
Total	7	6	6	3	N.A.	N.A.	

More specifically, social media were used for customer marketing and employee engagement at all four companies. Mobile apps were similarly used for marketing purposes and engagement and for hotel and restaurant bookings; additionally, at HO4, mobile apps had been developed for forms approval as part of a cross-company initiative to replace

paper form filling. Cloud computing is well-established in all four companies, mainly for Software-as-a-Service (SaaS) information systems—PMS like Oracle, SAP and other mainstream packages. Scalability and security were noted as reasons for migration by H2 and H3 and to “amalgamate the diverse systems and services of varying age and generations of technologies for them to co-exist harmoniously” at HO2. Analytics/Big data were used at three of the four companies for customer data analysis and business performance analysis, and both HO2 and HO3 plan significant new initiatives with these technologies, including at HO2 for “compliance, anti-money laundering and financial crime monitoring and management”. HO1 and HO2 also claimed to be using AI applications: at the former, this involved “predictive analysis models, security [and] building management”, at the latter, “to automate compliance and AML [Anti-Money Laundering] operations” and to “complement and shadow human-driven processes”, although this was “still in its nascent phases”. IoT had been used at HO1 for “casino gaming chips” and “building sensors” since 2007, and at HO2 for “payment system operations and employee services automation” since 2017. At HO3, IoT had been “partially implemented” but plans were in place for a multi-purpose use of IoT in a new flagship hotel in 2024, and plans for further roll-out of IoT and AI were in the roadmap. Robotics were at “proof of concept” stage at HO1 and were in scope to be deployed in the new flagship hotel at HO3 to be opened in 2024, but “RPA [robotic process automation] is currently in use to automate some manual processes”. AR/VR was under study at HO3, there being a “high possibility” that it would be implemented soon. Only at HO1 is this technology in place, AR being used for customer engagement, VR for construction planning, and mixed reality (a combination of AR and VR) for “entertainment experiences”.

These thumb-nail sketches suggest varying degrees of digitalisation, with HO1 being arguably the most advanced (the range of technologies used providing a reasonable degree of digitalisation), followed in order by HO2, HO3 and HO4. The objectives of digitalisation projects varied across the four hospitality enterprises studied and can be viewed as ranging from incremental to radical innovation. H2 noted that the focus had been to “overhaul a number of key operational areas taking them from literally pencil and paper (plus on occasion, hand-held calculators) operations to complete digital (or point-in-time tech) transformation of said operations”, and that the main objectives were “operational efficiency and meeting customer expectations with the changing times”. Competitive pressure and the need to differentiate from the competition were additional drivers of digitalisation, which had involved the “automation of manual processes that have become too unwieldy or no longer necessary with the advent of digital services”. H2 added that “digital transformation in the context of a true  $24 \times 7$  (once open never close) casino organisation is regarded essential” and that this required the interweaving of the technologies and processes necessary “to run the organisations in order to remain relevant”. H3, however, although she noted that to “enhance customer experience through mobility and digital solutions” was a key objective, also stressed the need to “integrate IT infrastructure to standardize and enhance agility to support growth and ease of management”. There was a clear requirement to meet customer expectations whilst at the same time retaining a controlled and strategically sound technology stack. H3 added that to “improve customer reach through analytics” was a further key objective.

For H1, the objectives of digital projects included “enhancing customer and employee self-service touch points and processes, labour efficiency, process controls, product consistency, [and] customer experience”. H1 noted that “our casino floor is one of the most advanced operating environments for Table Games within our industry, with a leading-edge chip tracking system deployed for a variety of operational processes and tracking”. He added that “we digitized processes for everything from uniform control, employee engagement, casino gaming, customer relationship management, mobile apps, self-service ordering in restaurants, internal communications, and digital guest experiences”. H4, a global operator headquartered in Singapore, noted that “thanks to the Singapore Tourist Promotion Board’s various schemes, hotels are taking up digital transformation”, and



cited the digitalisation of “all hotels forms approval in Singapore” as an example. The company’s main DT objectives are “to improve guest service and internal efficiencies”. For example, the company has introduced a Breakfast Entitlement System, which will “reduce tons of paper in the morning, as traditionally it is manually checked with print-out of the in-house guest list”. It will also further increase efficiencies as “the F&B [food and beverages] supervisor need not come to work early to prepare the list”. H4 also noted that “internally, we implemented on-boarding/off-boarding workflow vs. manual forms to provide staff access to applications”.

These perspectives were generally supported by the two IT providers. P2 observed “we do see digital transformation projects but it’s slow for existing hotels”. Projects were generally aimed at “enhancement of the guest experience journey”, but “they are mostly piece-meal”. However, “for new constructions, the latest tech is part of the plan”. These sentiments were echoed to a degree by P1, who noted “comparatively, the hospitality industry has been slow to embrace digital transformation”, but that one effect of the COVID-19 pandemic has been the increased number of operators using digital technologies and that in particular there has been greater “speed to move to cloud”, particularly in the casino market. P2 similarly emphasised that “the main driver has been enhanced guest experience by allowing customer control over their loyalty accounts and management of their stay”.

### 3.2. RQ2. What Role Has IT Strategy Played in Digitalisation in the Hospitality Industry?

All six interviewees maintained that IT strategy had played a key role in guiding digitalisation in their companies or in the industry as a whole. There were, however, significant differences in the nature of the IT strategy and how it was used to guide digitalisation. At HO2, where the overall business strategy is “aggressively profit-driven”, the strategy was mainly concerned with “keeping the company sustainable while satisfying the financial objectives decreed”, as this “determined the strategies of the company across the board”. H2 reported that “all IT projects and initiatives are centralised via the office of the CIO and prioritised in conjunction with the key executives responsible for operations and finance”. Key IT projects typically span 12–18 months, but some may last several years “to allow for measured transformation”. Overall, “IT Strategy is closely aligned with business strategy”.

In terms of project ownership, HO2 has pursued a shared responsibility approach, with the IT function and line management jointly responsible for IT and DT project sponsorship and management. H2 reported that “the office of the CIO has full accountability over the delivery of all IT transformation projects with close partnership and joint-accountability with relevant operations leadership”, and that this covered all project stages, “from inception, design, prototype, build, test and ultimately assimilation into operations”. All key IT initiatives are “periodically reviewed and re-prioritised as necessary throughout the life-cycle of the projects in line with evolving business priorities with executive project owners and sponsors”, who are “typically the CIO, CFO, CMO and respective COO’s of business operations in gaming and hospitality”.

H3 reported that the company IT strategy is developed by the head of the IT department in conjunction with key department heads (Marketing, Operations, and Finance and Accounting) and that it “focuses on integrated infrastructure, standardization and data analytics to support the company business strategy of ‘Expansion’ and ‘Diversification’”. There is a company Transformation Office, led by the Group CEO, comprising two “transformation tracks”: Business Transformation and Technology Transformation. Individual projects are reviewed and revised on an annual basis. The company’s IT strategic plan was seen as “a master framework for the company’s digital transformation program. It defines key IT initiatives with priorities, objectives, results, [and] risk and impact assessment”. More specifically, DT objectives were to “enhance customer experience through mobility and digital solutions”, to “improve customer reach through analytics”, and to

“integrate IT infrastructure to standardize and enhance agility to support growth and ease of management”.

At HO1, the IT Strategy is led by the two technology departmental heads within the Digital and Technology Services Division. H1, one of these two senior vice-presidents, commented that the IT strategy “is probably best defined as a series of initiatives instead of a single document outlining these initiatives”. Digitalisation has been progressed on a project-by-project basis, through “collaborative development”, with unified teams combining members of the IT function with user staff and management. As regards technology integration, H1 maintained that “any issues as regards overall technology connectivity can be addressed by using APIs and service bus layer software”, and that as regards management information, “analytics teams need to develop the skills and knowledge to access different datasets as required”. He described DT not as a process but as a “state of being”. The company has successfully completed a number of projects on “mobile first, SSO [single-sign-on], cloud, e-services, and other initiatives”, which “have led the business forward to award-winning customer service and HR implementations”, and that “these implementations have typically been an early catalyst in the transformation of further processes to digital”. Innovation initiatives can be driven internally from the Digital and Technology Services Division or may result from business requests. The IT function serves as a gatekeeper to ensure that such initiatives are aligned with the achievement of key corporate objectives, such as a positive return on investment (ROI), enhanced customer experience, or additional process controls. More specifically, the strategy at HO1 was summarised as using digital technologies to “enhance customer service and the customer experience”, “drive beneficial change in the internal user experience”, and “deliver overall efficiency gains”. Budget considerations may run up to the board level when required.

At HO4, there is no overall digitalisation strategy at present, as the company’s current focus is on “the ability to develop faster and cost-effective ways of opening hotels”. Digital projects are progressed in support of this strategy. H4 cited the example of the recently implemented cloud-based Point of Sales (POS) system “which reduces the time to setup, as it is a standard shell across all hotels compared with on-premise solutions in the past”, and that “the critical one now is virtualization as we target to open more hotels thru management agreement”. In addition, there were separate projects “to drive all hotels to digitize their forms approval” and “to implement mobile check-in for all Singapore hotels”. These projects have been led by various functional heads—“mobile check-in is driven by Director of Ops, while paperless workflow approval [is driven] by Finance”. H4 also highlighted the critical importance now attached to cybersecurity, noting that the company’s “cyber posture is low and is now a top priority with a Cyber Security Manager now on-board”. A key business aim is “to be a TRUSTED global hospitality company”, and the cybersecurity strategy is reviewed annually with a “quarterly cyber posture update to the Audit Committee”.

P2 observed that the nature of IT strategy in the hospitality sector “varies depending on if it’s a large chain, regional chain or smaller independent”, that “the project is usually ‘owned’ by the IT department for implementation”, and that the sponsorship for such projects would normally be business-initiated. For example, “if it’s a marketing tool, then the request would come from the Marketing department but execution is usually by the IT department”. P2 also suggested that IT Strategy was becoming “more generic in nature”, and “isn’t set in stone”. For example, the strategy may entail top-level guidance, such as “tech solutions should be cloud and web-based”, but that project initiatives and implementation could be left fairly open within the framework of such guidelines. P2 added that “usually the client hotels know they need to have a digital transformation, but don’t know how to approach it, hence we as consultants get engaged in this process”.

P1 observed that IT strategy for Integrated Resorts, which include Casino operations, are “typically driven from the gaming portion of the business which is the most profitable”, adding that “gaming systems require a much higher level of IT security and failover capabilities compared to the wider hotel industry due to gaming regulations”. He noted

that “most of the larger enterprise customers have developed their own digital solutions which utilize a combination of tools and integrators as well as their own IT resources”, and that “while business leaders play a part in selecting systems, IT will nearly always be responsible for selecting potential partners to choose from”, and that “due to the number of systems involved and the complexity of integration, major changes to the IT ecosystem are less frequent, and major upgrades typically only occur every 2 or 3 years”. He suggested that, across the sector “the common focus has been on mobile guest-facing customer loyalty apps, which creates a customer-centric ecosystem for points accumulation, redemption and, once integrated with PMS, a self-service hotel booking solution”.

#### 4. Discussion

The study results suggest that the degree of uptake of digital technologies has varied across the industry, with some companies fully embracing digitalisation, whilst others have been more conservative. The companies studied also evidenced different perspectives on the role of IT strategy in guiding digitalisation. This gives rise to a number of issues relating to both theory and practice that emerge from the results that are worthy of further consideration.

Firstly, developing or recruiting the necessary skills and competencies to implement and support digitalisation projects and to usher in necessary changes in culture and attitudes is a key issue that is threatening digital innovation in the industry. H2 stated that “as technology continues to evolve, businesses need to recognise that to remain viable, technology literacy is key to understanding how the evolution of technology is constantly impacting their business models”. Most digitalisation projects use agile methodologies, geared to the rapid development of prototype solutions (use cases), and their subsequent roll-out across the company. In such circumstances, project management skills are particularly valuable in ensuring project sponsorship is maintained, human and financial resources are in place, baseline requirements are satisfied, cultural change elements are accommodated, and benefits are delivered. Here, there is often a difference in capabilities between the larger and smaller operators. P2 observed that “the major chains have the internal resources and funding to design and implement digital transformation compared to smaller regional hotel chains and independent hotels”, but added that “the major chains are less nimble”. H2 highlighted the importance of “the often-underestimated change management involved in all transformation projects”, which requires “much creativity to convince the workforce to migrate from their existing comfort zones to their yet-to-be-realised better future”. This has implications for all staff, including those in the IT function. As Polakova-Kersten et al. [26] recently noted “the information systems (IS) literature has underscored the importance of employees, particularly the IT workforce, in connection with the success of DT efforts” (p. 2).

A related aspect of the skills shortage is the existence of digital technology expertise in end-user departments, sometimes referred to as “Shadow IT”, which often entails the autonomous development or use of software, hardware or IT services by the business functions, without involving the company’s formal IT function [46]. In this context, H2 specifically noted that “given the size and diversity of the workforce of a typical casino company, shadow IT operations do pop up every now and then”, and suggested “it is part of the responsibilities of the CIO office to discover and manage them back into the centralised fold”. Shadow IT has grown in some hospitality companies with the increased availability of cloud services and user-friendly software development environments accessible by technically astute end-users. Despite the negative connotation of the term, and the evident undermining of the IT organisation, shadow IT can be the catalyst for user-driven innovation and process improvement [47]. In the companies studied, and particularly given the business sponsorship and co-ownership of digitalisation projects, this seems to have been the prevalent attitude to such end-user initiatives.

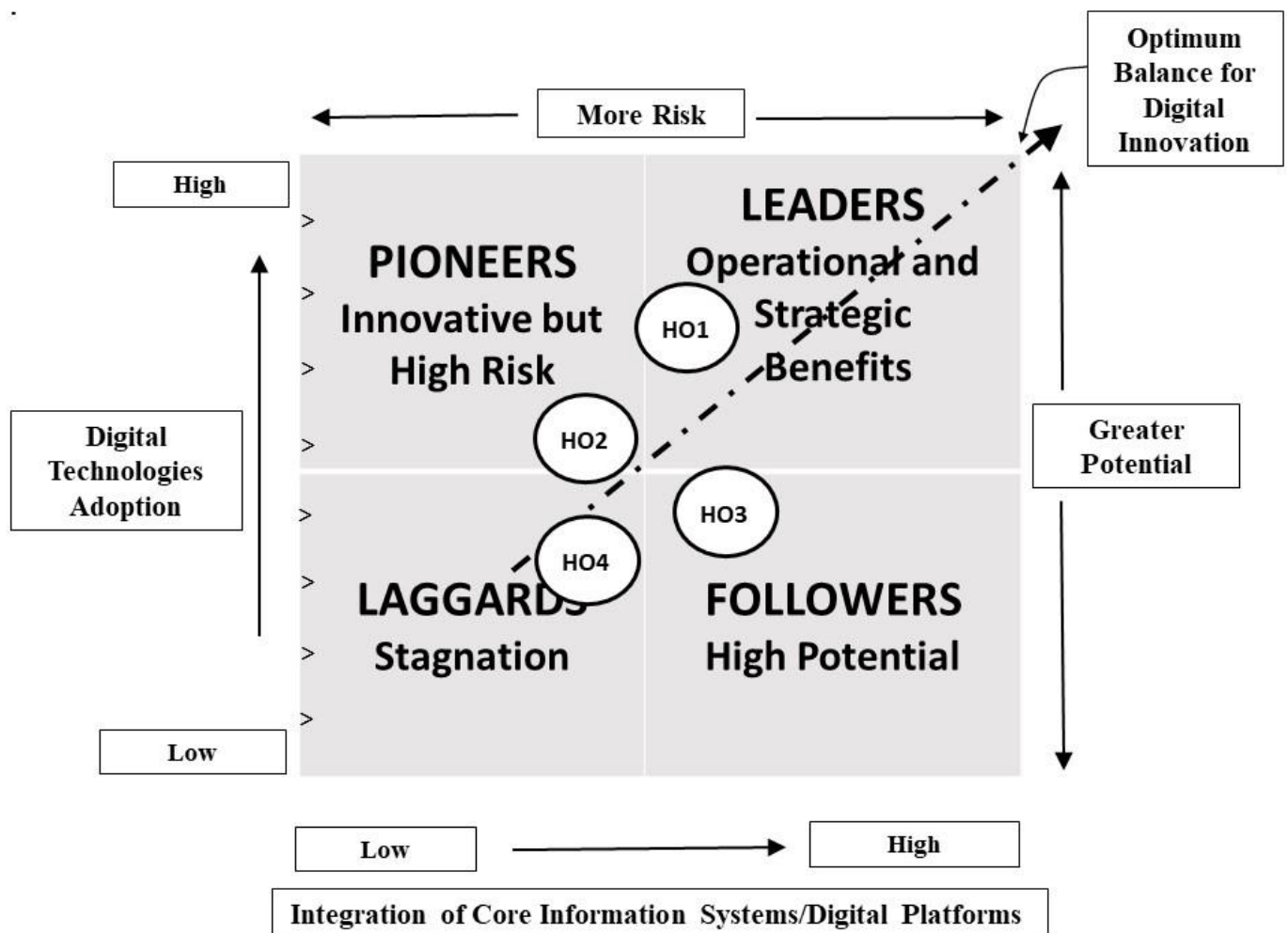
Secondly, as regards the DT paradoxes identified by Qin [27], the interviewees provided some examples of these paradoxes, but more significantly highlighted another trade-off of particular relevance to the hospitality sector: the extent of digitalisation (driven by the need to meet customer expectations and continually innovate) versus the integration of the technology stack (and associated issues of data consistency and cybersecurity).

The integration of technologies—as solutions are implemented in response to rapidly evolving customer expectations—was discussed by all interviewees as a challenge that had to be managed, but this was only explicitly addressed in corporate IT strategy by one of the interviewees (H3). This trade-off between developing customer-centric applications and retaining technology cohesion was recognised by the two IT providers (P1 and P2), who considered lack of technology integration as a significant risk within the hotel industry, due in part to the haphazard introduction of customer-oriented digital applications and devices. This view was shared by two of the hotel companies' senior managers (H2 and H3). H1, however, expressed the view that APIs—small software products—could provide effective integration between digital technologies and applications, but there was no overall consensus amongst the six interviewees on the value of APIs as an integrative tool. Some technology companies position APIs as the panacea for all integration ills. Google Cloud [48], for example, suggest that APIs are critical components of successful digital transformation. In the context of digitalisation in hospitality, technology integration is in some regards the “elephant in the room”. The importance of technology integration is acknowledged by all parties, but evidence of this being incorporated into IT strategy, policy or plans was limited.

Other issues closely interconnected with this central dilemma also surfaced. The pressure to continually innovate with digital technologies needs to be weighed up against the implications for data integrity and cybersecurity. For example, digital twin technology, which is as yet not in evidence in any of the four main hotel groups in the study, is presented in some of the recent literature as offering “a multitude of benefits” for the hospitality industry [4] (para. 1), and Khan [49] provided a number of use cases of how digital twinning is now being used in the sector. However, such innovations often involve corporate data (e.g., customer, product) and business transactions (e.g., purchasing a product) that need some form of interfacing or integration with corporate systems. Failure to properly plan and manage such integration can result not only in system performance problems and data inconsistencies, but also new cybersecurity risks. With the exception of H1, the interviewees exhibited a cautious, considered approach to innovation, favouring incremental rather than radical change, reflecting the key importance of cybersecurity and regulatory compliance in the sector.

The findings reveal differences amongst the four hotel companies as regards these two change dimensions—i.e., the integration of systems and technologies, and the degree of digital technology deployment. These differences can be graphically represented on the four-quadrant model put forward by Wynn and Jones [31] (Figure 1). The four companies can be profiled as follows:

- HO1 is in the Leader quadrant, having widely embraced digitalisation, notably in its gaming operations and customer entertainment and engagement. Technology integration, however, is less robust, relying on the mainstream applications, APIs and bus layer software to provide connectivity with other software packages and digital technologies. Innovative applications of state-of-the-art digital technologies are delivering clear business benefits, but lack of an integration strategy and policy may already be incurring disproportionate maintenance overheads and data reporting inconsistencies. Whilst HO1 is the most advanced of the four companies in terms of digitalisation, it faces potential risks related to its advanced digital technology platforms and related issues regarding overall technology integration.

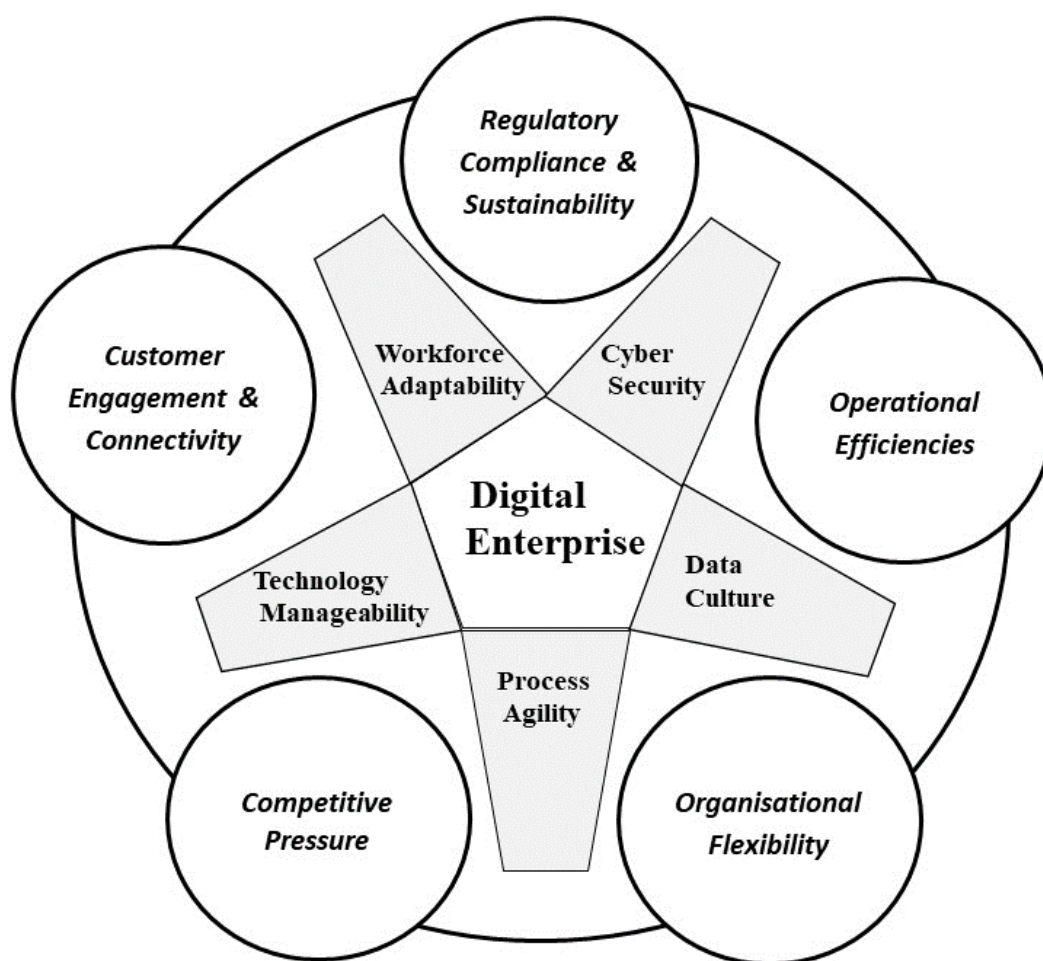


**Figure 1.** IT profiles for hotel operators: Laggards, Pioneers, Followers and Leaders (based on Wynn and Jones [31]).

- HO2 is a Pioneer with a relatively high degree of digitalisation in most parts of the business, with a strong focus on change management but with no real technology integration strategy, other than cloud migration. The company has multiple systems and technologies and risks significant maintenance overheads in providing the required connectivity and security. H2 noted that the aggressively profit-driven business strategy has resulted in the company “pursuing short-term gains with detrimental long-term effects”. A strategy and action plan for technology integration should be put in place to guide future digitalisation projects.
- HO3 has pursued a more top-down strategic approach to digitalisation, based around the deployment of the Oracle PMS, balancing the maintenance of technology integration with the need to respond effectively to new business requirements and challenges. The company has made limited but controlled progress in digital project implementation and is now well placed to speed digital innovation projects within its technical infrastructure framework, moving from its current position as a Follower. Because of the company’s relatively cautious approach and its attention to technology integration, its exposure to cyber risk is comparatively low.
- HO4 has prioritised compliance and the necessary connectivity of key systems to provide their HQ with the information required to manage the business effectively. They have narrowed their focus on IT to a scope that they can realistically and pragmatically manage and control. The company has drawn on government subsidies to fund some of its digitalisation projects, which to date have centred on the use of social

media for marketing and the introduction of electronic forms processing using mobile technologies—a relatively simple application which is nevertheless delivering clear business benefit. The company has implemented mainstream information systems from SAP on Azure and the Oracle Cloud PMS. It can now focus on extending current digitalisation projects whilst ensuring integration and connectivity.

Thirdly, of the drivers and pillars of DT identified by a number of authors [22–24], interview evidence suggested some were of particular relevance to the hospitality industry (Figure 2). As regards drivers, meeting customer expectations through new ways of engagement and connectivity was prioritised by all four hotel companies. Digitalisation was viewed as essential in maintaining regulatory compliance in the highly regulated gaming industry, and the quest for operational efficiency gains, which has been a key driver of IT in general for decades, was unsurprisingly also highlighted by interviewees, especially those experiencing increased complexity in their systems and operating environments. Organisational flexibility encompasses several aspects of the enterprise, including technology scalability, which was mentioned by several of the interviewees. H2, for example, noted that “bespoke cloud services were introduced to amalgamate the diverse systems and services of varying age and generations. . . It also lent itself to scaling and right-sizing to keep running costs optimised”. Issues regarding sustainability and the circular economy were not raised as key issues by the interviewees, but this may reflect the structuring of the questionnaire and the focus on technologies and IT strategy. However, sustainability does feature in these companies’ annual reports, and sustainability is therefore combined here with regulatory compliance as a driver of digitalisation.



**Figure 2.** Drivers and enterprise properties (shaded grey) for digitalisation in hospitality.



Rather than clearly identifying pillars of a digital enterprise, the interview material suggested a number of “properties” that an enterprise must develop and retain for continuing success as a digital enterprise in hospitality. These might be seen to fit under the umbrella classification of “strategic DT competencies” for successful hospitality management put forward by Busulwa et al. [25] and the “digital transforming capabilities” suggested by Warner and Wäger [50] (p. 338), in a more general context. Process agility involves not only re-engineering processes to take advantage of digitally driven opportunities, but also remaining open to continuous reinvention and change, possibly involving adoption of new business models. Workforce adaptability, also termed workforce orchestration in some recent literature [51], requires staff re-skilling and recruitment as necessary, but also the mindset to continually improve and adopt new skills and capabilities. Cyber and data security are a non-negotiable condition for business continuity, and here digitalisation may exacerbate, rather than resolve, cyber security risk, if other conditions are not satisfactorily met. In this context, technology manageability is a key condition, requiring the right balance between technology integration and the need for customer-focused innovation, providing a stable and manageable technology platform. A fifth property is the recognition of the value of accurate data as the source of information and knowledge. The need for, and value of, consistent data to support effective management is becoming ever more apparent and needs embedding in enterprise culture as digitalisation ushers in new technologies and practices.

Fourthly, evidence from the interviews suggests the nature of IT strategy has changed significantly in the digital era, with a sound technology-based controlling framework being less important than at the turn of the century, when software package selection and integration were seen as core elements of an IT strategy. The role of the IT function has transitioned from being the guardian of sound technology strategy to being super-responsive to customer expectations and new technology trends. As a result, IT deployment now often adopts more of a “seat of the pants” approach in response to user and customer requirements, and product selection tends more towards a “pick and mix” combination, rather than acquiring only those products adhering to strict technology guidelines. This was the case in three of the four companies studied, which, in terms of Earl’s [21] model of IT strategy development, represents an adoption of the bottom-up and inside-out approaches, with less attention being paid to a formal top-down perspective in which business plans and goals are identified, with which IT implementation is aligned within technology guidelines. The top-down approach was more in evidence only at HO3, where IT Strategy “focuses on integrated infrastructure, standardization and data analytics to support the company business strategy”.

This change in the nature of IT strategy was also observed by the IT Providers. P2 suggested that, although IT strategy “plays an important role in the digital transformation”, IT strategy was shifting from being prescriptive to becoming more user-driven. Whether technology solutions are in-house developed, off-the-shelf packages, customised, aligned with industry norms, cloud-based or on premises is now given less focus. Nevertheless, the IT function is still highly valued, as it plays the critical role in “the protection of data and adherence to legal requirements” (P2). Indeed, cybersecurity and data protection now feature not only in IT strategy but also in overall corporate business strategy and in the annual reports of major hospitality companies. The IT function needs to illustrate its strategic value by recognising and responding effectively to the objectives and expectations of company stakeholders, particularly in demonstrating progress in digitalisation. Getting the digitalisation process underway has become the key objective, rather than technology choices. Nevertheless, the different approaches to an IT strategy outlined by Earl [21] were of value in framing the approaches to an IT strategy adopted by the four companies, suggesting Earl’s model remains relevant and of value today. Evidence from the four companies studied indicates that IT strategy should combine all three perspectives to ensure an appropriate balance between the quest for digitalisation and the need for technology integration.

These results contribute to the literature on the changing nature of Business-IT Alignment (BITA) [52] in the digital era. To attain and maintain the key properties for digitalisation outlined above, an IT strategy must become more fluid and responsive to short-term business requirements and technology-based opportunities. A decade ago, research by Chen et al. [53] highlighted the need for a reconceptualization of IT and IS (information systems) strategy, and more recently Peppard and Fonstad [54] have put forward a more fundamental change. Rather than alignment of IT and business strategies, the authors suggest that “coevolving digital with customers and ecosystem partners” is now more appropriate, and indeed necessary, in the digital era. Their research found that “CIOs report that the best way for their organization to stay relevant is to shift focus away from the technology requirements of the business to the needs of customers. Their organization and the external environment are dynamically connected; technology is embedded in products, processes, work practices, and customer engagement”. The authors add that “this is a profound shift and has significant implications for how organizations approach technology and how they organize for IT” (para. 2). This perspective is very much borne out by the findings of this study, which indicates a similar adoption by the companies studied of a more flexible approach to strategy alignment and a clearer focus on external entities (platforms, ecosystems, customers, internet partners), as also advocated by Wynn [55].

## 5. Conclusions

This paper has examined how four major companies in the hospitality industry are approaching digitalisation and has assessed the role of IT strategy in providing a framework for appropriate investment and management of change. It also harnessed the perspectives of two major IT providers in developing the findings and in profiling the four hospitality companies, some being more advanced than others in their uptake of digital technologies and progression of digitalisation. All four companies maintained that IT strategy was key in guiding DT, but this by and large centred on progressing digitalisation in response to business priorities and specifying the project initiation, ownership and management processes. The technology component of an IT strategy has become less evident as the pressure to innovate and progress digitalisation has increased. In such circumstances, workforce adaptability, process agility, technology manageability, cyber security, and the embedding of a data culture are key properties in the transitioning to a successful digital hospitality enterprise.

There are clearly limitations to this research. It is based on six in-depth interviews and four main hospitality companies, and thus generalisation about the industry as a whole must be qualified. Nevertheless, evidence from the interviews and follow-up exchanges with the interviewees provide some clear insights into how digitalisation is impacting the industry. In the companies studied, there are clear variations in IT strategy, and the lack of adequate development of the properties needed for digitalisation will present IT management with a range of increasingly challenging issues as the pace of change in the digital era accelerates. Appropriate strategies will be needed to effectively balance the management and resolution of legacy issues with the implementation of digital innovation projects required to satisfy rapidly evolving customer expectations.

The research results set out in this article highlight the need for further research in a number of interrelated areas. Firstly, as regards technology aspects, new studies might look in more detail at technology integration, if and how lack of integration could be undermining innovation and digitalisation projects, and whether this is incurring disproportionate maintenance overheads, notably as regards data integrity and cybersecurity. Case studies could also examine if and how technology itself can resolve these technology problems through the use of cloud platforms, APIs and bus layer software. Secondly, the human aspects of digitalisation could be further investigated, notably the significance of company culture and the need for change management in the hospitality sector. In this context, the profound shift in IT and business strategy alignment observed by Peppard and Fonstad [54] could be further researched, not least as regards the implications for the changing skills

requirements of the IT team and their business counterparts. Thirdly, subsequent studies may also contribute towards developing theory regarding digitalisation, which is still not clearly established in the literature, and its overlap and interface with existing theories of innovation and the circular economy. This could examine if and how the properties for successful digitalisation identified in this research are evident in other hospitality industry digitalisation projects. In particular, new research could profitably focus on the mechanisms and properties required for successful digitalisation across industry sectors, building upon some of the themes discussed in this paper. This might also help determine the significance of whether digital technologies are embedded in a company's products and services, or whether they are in the main just supporting existing processes. On-going research in other industry sectors [56] suggests this may be a key differentiating factor in determining the impact and nature of change brought about by digitalisation. Further studies in the hospitality and other sectors could provide greater clarity on this and other issues relating to digitalisation in organisations.

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