The Effect of Disruptions on the Hotel Industry: a Case Study on COVID-19's Effect on Hilton Worldwide

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ABSTRACT

COVID-19 had a large impact on the global economy, including the global tourism industry, which had to adapt due to travel restrictions and health concerns among consumers. This study aims to find how the hotel industry adapts in response to the changing customer segments and customer demands in response to a disruption. In particular, it offers a case study of the response of Hilton Worldwide to COVID-19. The research finds the strategy of Hilton Worldwide changed from growth focus to cost management, causing a more centralized governance structure. Moreover, Hilton Worldwide has put the Hilton Honors App in the spotlight, which can offer a fully digitalized and contactless check-in procedure. This research analyses this via a BPMN model. To cope with the loss of business travelers, a new business model for Hilton is proposed; renting out rooms as workplaces. However, this imposes new cyber risks such as; key Bluetooth signal interception, key interception when shared, a data leak and unauthorized access to Hilton Honors account. Finally, the findings are discussed in light of the pre-COVID-19 business strategy of Hilton Worldwide to identify opportunities and threats in the new strategy.

Keywords

COVID-19, disruptions, hotel industry, Hilton Worldwide

INTRODUCTION

The COVID-19 pandemic led to border shutdowns, travel restrictions and even total lock-downs and the socio-economic impact of the virus is likened to the scene of World War Two (Reuters, 2020). Global tourism almost came to a complete halt due to the travel restrictions and health concerns among consumers. These developments also significantly affected the hospitality industry, which in many countries is largely dependent on international tourism and on business travel (United Nations, 2020; Swarbrooke, 2016). Due to travel restrictions and health concerns among consumers, the hospitality industry has to adapt to changing customer needs and a changing customer base at least in the short run. In this paper, a case study will be performed on the Hilton Worldwide hotel chain. More specifically, firstly the IT governance structure of Hilton Worldwide will be assessed before and after the COVID-19 crisis, secondly one specific business process that was or could potentially be impacted due to changing customer needs will be analyzed. Lastly, the organizational structure of Hilton Worldwide will be shortly studied and this will be related to the concept of organizational resilience. Furthermore, the notion of resilience will be analyzed and according to an 'adaptive' perspective of resilience, a potential business case regarding the Hilton Honors application will be proposed. In addition, the cybersecurity risks of the proposed business case will be assessed. The results of this study will provide valuable insight into how companies and specifically hotels cope with disturbing events, how digital technologies can be used to change business processes and to become more resilient. Furthermore, this study will analyze whether the digital transformations made by companies were successful and suggest improvements; this provides a starting point for late-comers in the industry who have so far not been able to adapt to the changed environment.

RESEARCH

Objective

The rapid spread and impact of COVID-19 gave companies around the world little time to plan new strategies to deal with the changing business and political environment. This means practitioners had to act quickly with little time to really organize and carefully plan their approach. Now some time has passed and more information is available, it is time to take a breath and reflect on the large

decisions that had to be made and still have to be made. The objective of this study is to first identify the impact of COVID-19 on the tourism industry and what new challenges the industry now faces. Secondly, some important changes that companies made in their IT governance structures, business processes and risk management procedures are highlighted and assessed. In order to analyze changes made, this paper will perform a case study on the Hilton Worldwide, a widely known and internationally operating company.

This had led to the following research question:

How has the Hotel Industry dealt with changing customer segments and customer needs due to the COVID-19 outbreak?

Approach

A research design is the blueprint of a thesis or a study; it is the framework designed to find an answer to the problem statement. The design of this study is a case study to create a multi-faceted understanding of a complex issue in real life context. In this case study the approach of the Hilton Worldwide towards the COVID-19 crisis is examined on three different levels. First, IT governance and strategic sourcing, second Business Process Integration and third, Cybersecurity and Risk management. The use of a case study is useful to zoom in on specific problems that organizations face during the pandemic. After the case study is performed this study will provide generalizable insights for other organizations within the hotel industry. More specifically, the study will provide insights on how a Hotel can adapt to the sudden changes in the environment caused by a pandemic. These conclusions are based on a literature review to obtain as much relevant data as possible. Within the literature review secondary data from former research is analysed, identified and outlined. To provide an overview of the current knowledge and gaps in the existing literature. To provide a valuable answer to the problem statement attention must be paid to the validity and reliability of the academic sources. Therefore, this study primarily uses papers or journals that are peer-reviewed and have an adequate amount of citations. This literature will originate from Tilburg University's online catalogue, JSTOR and other online academic databases. However, due to the novelty of the virus and the lack of relevant research done studies published so far, also other sources of information will have to be used. Examples are news sources, business reports, etc.

TOURISM AND RECREATIONAL SECTOR

The Tourism Industry

The tourism industry is one of the fastest and most stable growing economies. This impressive growth is attributed to a strong global economy, increasing globalization, a growing middle class in developing countries, new business models and technological advances (WTO, 2019). Furthermore, the tourism industry itself is also seen as an important driver of economic growth (United Nations, 2020). This is because tourism is by nature a labour intensive market and provides many opportunities and benefits to hotels, restaurants, travel agencies, tourist attractions and much more. For example, jobs are also created indirectly due to construction and infrastructure development related to tourism. In 2019, the tourism sector accounted for 29 per cent of the world's services exports and about 300 million jobs globally (WTO, 2019). Now focusing on the hospitality industry, some trends can be identified that caused some disruption in the hospitality industry**.** These were related to the sharing economy (Airbnb), the increasing use and importance of virtual communities (TripAdvisor) and the increasing power of online travel agents (Booking.com and Expedia). The first and the latter result in increased price competition and an increased need to stay competitive; which in turn reduces the profit margin in the industry (Weisskopf & Masset, 2018). In addition, the increasing importance of virtual communities amplify the influence of word-of-mouth reviews (Chen & Xie, 2008). Therefore businesses focus heavily on the guest experience and customer engagement with their brand (Baglieri & Consoli, 2009).

Despite the recent growth in the tourism and hospitality industry, the impact of COVID-19 has and will likely have a significant impact on the hospitality industry (Riaz, 2020). In this report, the main issues identified for the hospitality industry were related to preserving enough cash to ensure business continuity, tackling cybersecurity threats due to the increase of the remote workforce, ensuring resilience of the global supply chain and lastly the potential damage to a brand (Riaz, 2020). Now, for the long-term perspective of the hospitality industry, one could be somewhat more positive. This is because global tourism has been exposed to a wide range of crises in the past. Between 2000 and 2015, disruptive events include the September 11 terrorist attacks (2001), the SARS outbreak (2003), the global economic crisis around 2008, and the 2015 Middle East Respiratory Syndrome (MERS) outbreak. None of them led to a longer-term decline in the global development of tourism (Gösling et al., 2020). This suggests tourism as a system has been resilient to disruptive events in the past. Nevertheless, much evidence is provided that the

impact from the COVID-19 pandemic will be unprecedented (Gösling et al., 2020).

The 5 companies with the largest market share in the Hotel industry are: Marriott International Inc., Hilton Worldwide Holdings Inc., InterContinental Hotels Group PLC, Accor SA, Wyndham Destinations Inc. (MarketWatch, 2020). Hilton Worldwide has a significant market share in the industry and mainly relies on tourism and corporate travel and events (Swarbrooke, 2016). These corporate events are an important driver of profit, since corporate travellers often have large budgets paid for by their firms and need a place to sleep after the conference is over (Swarbrooke, 2016). However, interestingly Hilton does not own many properties, as early 2018, nearly 90% of Hilton units were franchised properties (Hilton Q2 report). The implications of which will be discussed in the risk management section.

ANALYSIS

IT governance and strategic sourcing

In the last few years, Hilton Worldwide had a high focus on growth, primarily focusing on growth in market share and cash flow (Hilton Worldwide, 2018). The hotel organization mainly tried to achieve these high levels of growth by expanding the global footprint, opening more than one hotel per day, next to introducing customer oriented technology initiatives to personalize guest experiences (Hilton Worldwide, 2019). In these efforts, Hilton Worldwide tried to be an innovator, as the chain introduced cutting-edge innovations to be ahead of the competition (Johnson, 2017).

Hilton Worldwide is a highly decentralized organisation, as it contains 18 brands across 118 countries (Hilton Worldwide, n.d.-a). When an organization focuses on growth, decentralization is a popular approach (Weil & Ross, 2004). However, Hilton Worldwide aims to centralize technology developments across the different brands to provide a consistent customer experience (Johnson, 2017). This means both leaders of business units and C-level executives of Hilton Worldwide require decision rights in IT investments. This also applies to choosing the business application needs, as Hilton's strategy of customer intimacy requires local business units to co-decide in their IT needs, together with the C-level that wants to achieve consistency. Moreover, consistent with best practices on leaders of growth (Weil, 2004), business monarchies make the decisions on IT principles. For business monarchies to also make decisions on IT architecture and infrastructure, C-level executives need to be experienced in IT (Weill & Ross, 2014). As there is a small possibility that C-level executives in such a large company are tech savvy, these decisions can best be handled by an IT monarchy. Lastly, the business units required input in all other decisions to achieve their goal of customer intimacy, together with input for consistency from the C-level executives. This means input was provided by federal governance structures, which is a popular model for input (Weill & Ross, 2004). These findings suggest the IT Governance model of Figure 1, based on Weill & Ross (2004), for the pre-COVID-19 strategy of growth focus.

	IT Principles		IT Architecture		IT Infrastructure strategies		Business application needs		IT Investment	
	Input	Decision	Input	Decision	Input	Decision	Input	Decision	Input	Decision
Business monarchy		X								
IT monarchy				X		X				
Feudal										
Federal	X		X		X		X	X	X	X
IT Duopoly										

Figure 1. Pre-COVID-19 IT Governance

As a response in COVID-19, Hilton Worldwide announced a strategy of cost-cutting, reducing 'unnecessary' capital expenditures (Hilton Worldwide, 2020a), which is a strategy adapted by many companies during these times (Deloitte, 2020). To implement its business strategy of cost-cutting, Hilton Worldwide should have changed its IT governance model, as strategic alignment is crucial to achieve the organization's goals (Ping-Ju Wu, Straub & Liang, 2015). For this strategy, a centralization of IT governance is the most suitable approach (Sambamurth & Zmud, 1999), as this can increase standardization through a consolidation of IT assets and allows the organization to efficiently use these IT assets. To achieve standardization and cost control, senior business management committees are mostly preferred to make decisions (Weil, 2004).

The new focus on centralized IT governance means a business monarchy takes over decision rights in business application needs and IT investments. This means there is tighter control over the focus of which business needs will still need to be satisfied, and which strategic IT investments will still be made with a tighter budget. Moreover, IT architecture and infrastructure decisions can still best be made by a centralized IT monarchy (Peterson, 2004), as their experience in IT allows them to make the best decision in integration and standardization. A business monarchy remains the best committee to decide on IT principles, as it allows the C-level to set principles of cost efficiency and standardization, aligned with the business strategy. However, as the business strategy of Hilton Worldwide on customer intimacy continues to exist, the business units will still want to provide input for all IT decisions, together with input of the C-level on consistency. Therefore, the old input structure of a federal system for input should be maintained. These findings suggest the IT Governance model of

Figure 2, based on Weill & Ross (2004), for the after-COVID-19 strategy of cost management.

	IT Principles		IT Architecture		IT Infrastructure strategies		Business application needs		IT Investment	
	Input	Decision	Input	Decision	Input	Decision	Input	Decision	Input	Decision
Business monarchy		X						X		X
IT monarchy				X		X				
Feudal										
Federal	X		X		X		X		X	
IT Duopoly										

Figure 2. After-COVID-19 IT Governance

Not only IT Governance is changing. Hilton Worldwide needs to do more to ensure customers a safe stay after COVID-19. McKinsey & Company have established five theme shape post COVID-19 recovery efforts in operations (McKinsey, 2020). Accelerating end-to-end digitization by using new digital services capabilities to raise performance in customer experience is an interest for Hilton. They are already doing so via the Hilton Honors app, which will be discussed next.

Business Process Integration

Due to the spread of COVID-19, the Hilton Worldwide has carefully reconsidered their check-in process. In order to create the safest environment for their guests and employees, Hilton stressed the use of their app. The CEO of Hilton Worldwide Christopher J. Nassetta mentioned that "Certain mechanical elements of the experience are going to be digitized, but that is happening anyway. It'll just happen faster" (Sperance, 2020). Due to the current crisis, many guests of the Hilton hotels changed their expectation for hotel cleaning, disinfecting and number of contact moments (covid.Hilton, 2020). The app minimizes the number of contact moments between the guest and the employee and therefore curtails the risk of spreading the virus. Furthermore, a study by Shin & Kang (2020) found that if the

expected contact moments are minimized through technology, then the guests will foresee less health risks. In the situation before COVID-19 the app was not completely integrated within the business process, because guests did not feel the necessity to use the app. Whereas the necessity in the situation during COVID-19 drastically increased, because the guests are more inclined to take precautions related to their safety and health. This change in customer needs resulted in a different aim of Hilton Worldwide within the check-in process. In the situation before COVID-19, Hilton Worldwide's primary focus of the check-in process was customer oriented. This correlates with the core values that Hilton tries to live up to. One of these values is related to hospitality. Therefore, Hilton Worldwide is passionate about delivering exceptional guest experiences (Hilton Worldwide, n.d.-a). Before COVID-19 Hilton employees were an essential component within the check-in process to ensure that this exceptional guest experience was delivered. The aim of Hilton Worldwide shifted towards creating a safe environment for the guest to check-in as the virus was spreading. This shift also correlates with two core values of Hilton Worldwide, namely, integrity and acting now. Hilton claims to always do the right thing and operate with a sense of urgency and discipline. In times of a pandemic like this Hilton Worldwide identified that the "right thing to do" is ensuring the safety of the guests and their employees (Hilton, 2020). Thus, Hilton Worldwide decided not to make the employee an essential part in the check-in process anymore. Therefore the CEO of Hilton Worldwide announced that "the Hilton Honors app will become a key component of the company's health and safety measures going forward" (Sperance, 2020).
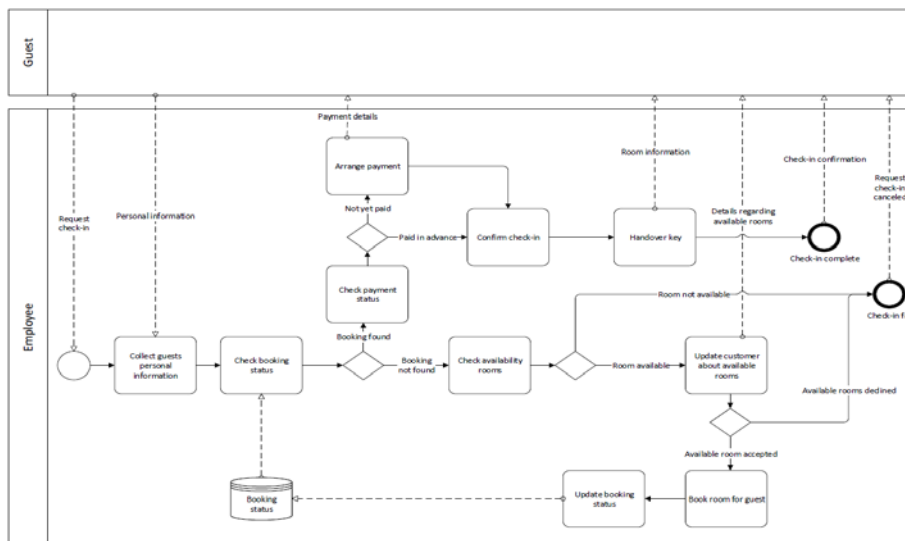

Figure 3. Pre-COVID-19 Check-in Business Process

Figure 4. After-COVID-19 Check-in Business Process

Hilton's shift in priorities, the changing customer needs, and the urgency created by COVID-19 have resulted in a significantly different check-in process. Furthermore, it changed the way IT is integrated within this business process. This study exemplifies the changes within the check-in process before and after COVID-19 with the use of two BPMN models. In Figure 3, the situation before COVID-19 is illustrated with the employee as a core component of the check-in process. Figure 4 exemplifies the situation during COVID-19 and also displays the shift in priorities of Hilton Worldwide with the honors app as core components of the check-in process.

In both models we used swimlanes to illustrate the main actors within the check-in process. Within the first model the main actor is the employee and in the second model this is the app. We only displayed the tasks of these two essential actors to emphasize the effects that COVID-19 had on the check-in process. In terms of contact moments between the guest and the employee and therewith, illustrating which situation minimizes the risk to spread the virus. Furthermore, we used message flows to present essential informative interactions. In Figure 3, the message flows interact between the guest and the employee, whereas in Figure 4 the message flows are connected between the app and the guest.

To conclude, COVID-19 had two main effects on the check-in process of the Hilton hotels. Firstly, the COVID-19 situation stressed the importance of a new way to ensure the safety and health of both the employees and the guests. Hilton Worldwide identified that the app was a useful solution for this problem. By minimizing the number of contact moments between the guest and the employee with the use of the app Hilton Worldwide ensures the safety of both parties. Secondly, the effects of COVID-19 accelerated the digitization of certain business processes performed by Hilton Worldwide and created the urgence to integrate IT systems faster. These two main results are illustrated in Figure 3 and 4.

Cyber Security

Due to the global economy, organizations are increasingly interconnected with their environment and each other. This means risks and especially 'systemic risks' increase (Helbing, 2013) and due to this effect even small, seemingly insignificant events, can have a 'butterfly effect' and pose a real threat to a firm (Annarelli & Nonino, 2016). This increased 'systemic risk' coupled with increased market uncertainty and increasing numbers of disturbing events has shifted the strategic focus of organizations towards resilience instead of profit (Hamel & Välikangas, 2003). This is shown by an increasing number of academic papers on the concept of resilience in the management and business literature (Conz & Magnani, 2019). However, despite this development, the definition of resilience has not become much clearer and the literature revolving around organizational resilience has become increasingly fragmented. In a systematic literature review, Conz and Magnani (2019) have distinguished the different perspectives of resilience, mostly focusing on the temporal dimension. In short, one can study the notion of resilience before (proactive), during (absorptive/adaptive) and after (reactive) the impact of a disturbing external event (Conz & Magnani, 2019). This of course is very relevant to the context of this paper, which is the outbreak of COVID-19. As discussed in the first and second section of this paper, changing IT governance structures or business processes can be used to deal with the changing customer demands caused by this pandemic. For this last section, the focus will be on the organizational resilience of Hilton Worldwide from an **adaptive** and **proactive** perspective; thus, it will be considered which factors influence resilience *before* a crisis occurs and how firms can *adapt* to environmental changes due to a crisis. Firstly, for the proactive perspective, the organizational structures of Hilton Worldwide will be assessed according to important factors determined by research (?). Secondly, the adaptive perspective will be used to determine a potential adaptation to the new circumstances that the COVID-19 crisis has

brought. More specifically, a new use of the Hilton Honors application will be proposed and analysed based on the Cyber-risks that could occur.

Case study: Hilton Worldwide Holding Inc.

As mentioned previously, Hilton Worldwide is an important player in the hospitality industry. It has a vast global presence and relies significantly on global travel, whether that be tourism or corporate travel. Another important source of revenue are the hosting of corporate events, These corporate events are an important driver of profit, since corporate travelers often have large budgets paid for by their firms and need a place to sleep after the conference is over (Swarbrooke, 2016). The impact of the COVID-19 outbreak on global travel and tourism has thus also been massive for the hotel industry and Hilton Worldwide. The number of global flights dropped by more than half and significantly impacted the customer base of the hospitality industry. Due to travel restrictions and health concerns, both corporate travel and tourism have seen a massive decrease (Gössling et al., 2020). Especially in countries where the virus spread rapidly or had strict travel restrictions, the consequences for hotels were significant; with some countries having a reduction in guest numbers of over 90% compared to 2019 (Gössling et al., 2020). Due to the reliance of Hilton Worldwide on corporate clients and tourists, they suffered a significant loss of revenue in the second quarter of 2020 due to the pandemic, reporting an 81.0% decrease in revenue per available room (RevPAR) and a decrease of 77% of management fees and franchise and licensing fees compared to 2019 (Hilton Worldwide Holdings Inc., 2020). The fact that Hilton Worldwide has three different divisions; namely, the management and ownership of their Hotels, a time sharing division and a franchising division, slightly softened the blow. Interestingly, Hilton Worldwide owns little properties and early 2018, nearly 90% of Hilton units were franchised properties (Hilton Worldwide Holdings Inc., 2020). Therefore, the main issues with liquidity fell on the shoulders of the franchise owners as mentioned in an interview with the Hilton's CEO Chriss Nasseta (CNBC, 2020).

Organizational structure is starting to be recognized as an important factor for organizational resilience (Andersson et al., 2019; Tengblad & Oudhuis, 2018) and Linnenluecke (2017) saw it as an understudied aspect in management research. In a case study performed by Andersson et al., (2019) three constructs that are beneficial to organizational resilience were identified; namely, risk awareness, preference for cooperation and agility and improvisation. When these constructs are related to organizational policies or structures, it is vital that not only top management but the whole organization is committed to organizational resilience (Weick &

Sutcliffe, 2011); which means that followership plays a large role (Andersson, 2018). The most important requirement for followership is power distribution so that employees feel empowered and incentivized to take responsibility, but also that they feel trusted. Power distribution thus is also related to decentralized organizational structures, as Hilton Worldwide has established. Furthermore, The Hilton tries to engage upper level management to experience and understand the daily challenges their employees face, as every senior management member has to spend 3 days a year on the front lines; also called the 'immersion' experience (Heath, 2014). This practice facilitates greater trust between lower level employees and senior management and it could be argued that this also increases the perceived power distribution as the lower level employees feel more seen. All in all, Hilton Worldwide seems to check a lot of the boxes showcased by Andersson et al., (2019), with a very decentralized structure, a large preference for cooperation as shown by the 'immersion' of senior level management and an inspirational leader (Cooper, 2014). However despite this, Hilton Worldwide was still hit hard by the pandemic. This might showcase the fact that proactive and reactive resilience might not be enough. For this reason, another term will be introduced: strategic resilience, which is very much related to adaptive resilience. Strategic resilience is defined as " *the ability to dynamically reinvent business models and strategies as circumstances change*" ; which requires "*alternatives as well as awareness-the ability to create a plethora of new options as compelling alternatives to dying strategies*" (Hamel and Valikangas, 2003).

For the purpose of this case study, we suggest a potential business model that could increase strategic resilience. Namely, to rent out the hotel rooms as workspaces for people who seek a place to work for several hours, and thus do not need to stay the night. Recently such an initiative has started in the Netherlands, where an application has been built which facilitates the use of hotel spaces and rooms to be used as workspaces (Remmers, 2020). With many governments encouraging or even enforcing employees to work from home, and people not having an ideal work situation at home, the demand for workspaces might increase. The hotels could fill this gap with all their unused room. By doing this a new customer segment is served, which helps hotels to create revenue in times with less travelers. To rent out the hotel rooms as workspaces Hilton can make use of it's own application the Hilton Honors app (Hilton, 2020). With this application customers of Hilton can book a specific room by themselves in a selected Hilton Hotel. The app shows which rooms on which floors are available and let's the customer choose which one it prefers. The app also provides a digital key to unlock the room so customers can skip

the front desk and go directly to their room (Hilton Honors, 2020). Continuing on using this app, Hilton can easily use this interface to let people book their rooms for a couple of hours to work instead of staying the night. However renting rooms for shorter periods creates new risks. These risks will be discussed and analysed below.

Strategic resilience

Unauthorized physical access

In the hotel industry, physical access control is of major importance. There is a lot of traffic going in and out of the property and there are many different rooms and entrants that need to be properly managed. It is for example vital that guests only have access to their own room and not for other rooms. This has traditionally been done by physical keys or a later development such as keycards. These keycards are currently the most used solution for controlling physical access. However, as mentioned previously, the Hilton has started using a 'digital key' which can be used with the help of a smartphone and as with any new innovation/development; one has to think about the implications this has on for example security. The consequences of using a digital key instead of a keycard for the physical access controls, seem to depend on the security of the digital key.

Bluetooth interception

To open doors using the digital key provided by the hotel a bluetooth signal is used. Bluetooth replaces the need for cables when transferring data from one device to another using radio transmissions (Chandan, Anand, Shradha Raj, Jeevith, & Venkatesh Bhat, 2019). When the user presses a button on his or her phone a bluetooth signal is sent and when the user is within a few feet from the lock, it will open. One possible way to open doors which have a lock which can be opened using a digital key is a replay attack. Such an attack can easily be done using a bluetooth suite which is part of the python suite named Scapy, which is available online. When a device is using a static key, you only need to capture the packet stream using an antenna when somebody is opening a door using the digital key. After that they only need to replay the packet to be able to open the door (Sevier & Tekeoglu, 2019). Shawn kanady is a tech security expert, who, through his company, helps hotels to secure their IT systems. They were able to successfully carry out a replay attack. They managed to capture the bluetooth signal to open the hotel door via an antenna. Thereafter they could simply replay the bluetooth signal and open the door (Kimbleton, 2018). Furthermore, in 2018, a finnish cybersecurity firm discovered a bug in an older

model digital hotel lock which used RFID-technology. That bug made it possible for hackers to generate a spoof master key. Since the firm was hired to find bugs, they were also able to patch the bug before a malicious hacker could do any damage. (Schwartz, 2019).

There is definitely more than one way to get access to hotel rooms, but getting access through the bluetooth signal requires quite a lot of effort. Therefore the likelihood of somebody intercepting the bluetooth signal is fairly small. Although probably only the guest staying in that particular room is impacted a lot, the hotel is in such a case less impacted. However, the impact is somewhat higher since it does create bad publicity.

Key share

Another feature of the Hilton Honors digital key function, is the ability to share the key to a room. Via the application, the key can be shared via SMS or email through a one-time activation link. The controls installed for this function are that a shared password (or symmetric key) has to be put in to gain access to the message (the digital key). This password will not be stored within the application and thus will have to be shared through other means. Furthermore, to improve security, the one who has shared the key will be able to see who currently has access to the digital key. For this feature to be exploited, one would need to either be able to distribute the sharing request or be able to intercept the activation link (message) AND the shared password (symmetric key). These security measures ensure that the access to the room is encrypted with a password, that both parties have to know and it also makes sure that only 1 person can access the digital key. The likelihood is therefore also dependent on the distribution of the password (symmetric key). Due to the security measures installed for this function, the likelihood has been assessed to be low; and the impact is high since it could offer unauthorized access to all the private and public spaces the digital key provides access to.

Others

Data leak

The use of the smartphone for digitally unlocking the room, does not necessarily create more data. The keycards used by Hotels likely used similar types of data to give access. However, this data is now being consolidated all in one place and it is being connected with each other. All the information the mobile application collects is now stored with all the personal information the guests provide to make use of the Hilton Honors program and in addition to this now information about who accesses the hotel where and when is now also

collected. This data can be considered very sensitive, since it reveals a lot about the person and where it is at what times. Therefore, the risk of a data leak is more important. It is hard to assess the probability of a data leakage happening but as mentioned by Bruce Sneijer: 'no system is impenetrable, it is only a question of time'.

Unauthorized access to Hilton Honors account

When signing up for the Hilton Honors app, it registers: first and last name, phone number, email address, country of residence, address, region and postal code. After this information the customer creates a password, this password does not need to be confirmed via email. When finishing the registration the customer can use the application. However if the customer wants to book a room, their credit card information is needed. A credit card can also be added to the account before booking a room (Hilton Honors, 2020). When the customer wants to login into the application you need your Hilton Honors number and password to identificate and authenticate yourself (Anderson, 2020). If you are using an iPhone you can also use Face ID to log into the application. As a user of the application you are authorized to execute the system when booking a room, however it is assumed that you are not authorized to read and write the system.

Following this login system, a simple phishing email can allow hackers to access a customer's Hilton Honors account. Phishing techniques are still very effective these days, usually phishing emails ask for verification of certain information, such as account numbers, email addresses and passwords, allegedly for auditing purposes. Up to 20% of unsuspecting recipients may respond to them (Ma, Ofoghi, Watters & Brown, 2009). Hackers only need to know the Hilton Honors number and password and they are able to go into the victim's account. The impact of the phishing mail is considered to be low to moderate, as it is defined as a personal fault instead of Hilton's fault. However the application also does not send out a notification if someone logs into the Hilton Honors app with

Somebody else's credentials. Shifting the responsibility more to Hilton creating a slightly bigger impact for Hilton. The likelihood of this happening is moderate to high, depending on the user. This problem will mostly create bad publicity for Hilton. Based on all the discussed risks above a risk analysis is made in Figure 5.

Discussion

As discussed previously, the risks for renting out the hotel rooms as workplaces by using the Hilton Honors application are: key bluetooth signal interception, key interception when shared, a data leak and unauthorized access to Hilton Honors account. In the proposed new business model the frequency of using the application will be higher. Therefore the server experiences more traffic than it's used to now. Accurate testing beforehand needs to be done, in order to keep the application running so that every customer can check-in and use the digital key via the application. Other important aspects relate to the change of guest influx, this means that the influx of guests during the day will increase significantly; this in turn has consequences for the difficulty for ensuring physical access control. For example, one risk that is present is a guest providing access to another person due to social norms (e.g. hold open a door for a person behind you). Research has shown that especially women highly value a proper and thorough physical access control policy (Swarbrook, 2016). This can be achieved by access control mechanisms, such as establishing time-slots for when someone can or cannot enter a specific area and making sure that a guest can only enter for example the hallway its room is located. As the risk analysis presents, the researched risks do not have a significantly high risk score (e.g. on a scale of 1 to 25, with highest 9). Meaning these risks will probably stay within the risk appetite of Hilton. Research shows that the postcrisis return will take years and that business travel will return at a slower pace than leisure travel (Curley, Garber, Krishnan, & Tellez, 2020). Therefore, the application can increase resilience for Hilton Hotel during the COVID-19 pandemic by

Risks	Likelihood	Impact	Risk score
Key Bluetooth signal interception	2	4	8
Key interception when shared	1	4	4
Data leak	3	3	9
Unauthorized access to Hilton Honors account	3	2	6

Impact: 1= little reputational damage, 2= moderate reputational, 3= high reputational damage , 4= moderate physical damage, high reputational damage, 5= high physical damage, high reputational damage

Likelihood: 1= very unlikely, 2= unlikely, 3= likely, 4= very likely, 5= almost certain

Figure 5. Risk analysis

using the new business model, generating a new customer segment to cope with the loss of business travelers during but also after the COVID-19 pandemic.

DISCUSSION

In regards to IT Governance, the new business strategy of cost management potentially means the C-level will pull the strings, while the business units previously also had decision rights together with the C-level. Transferring the decision rights of business application needs and IT investments to business monarchies seems to be the most appropriate governance model, as it allows standardization and efficiency (Sambamurth & Zmud, 1999). However, this approach also allows less customer intimacy, which is described as one of the core values of Hilton Worldwide (Hilton Worldwide, 2019). Therefore, even though it is understandable that Hilton Worldwide has to cut costs, at the same time the corporation should watch out that it does not hurt its core values in the process, as this will rarely mean a performance increase (Zajac & Shortell, 1989). Besides this, as customer demands change due to COVID-19, Hilton Worldwide should still make the necessary investments to satisfy these changing customer needs. Moreover, as the previous business strategy of Hilton Worldwide focused on growth, it is possible the corporation focused less on cost management in the past. A characteristic of resilient firms is that they already manage their cost before a disruption forces them to do so (Bradley, Hirt, & Smit, 2018). The possibility of a disruption in a company's lifetime is very high, so Hilton Worldwide should have anticipated this by cutting costs in advance.

However, the investments in the Hilton Honors App has indicated that Hilton Worldwide has not completely cut all innovation efforts. As Figure 3 and Figure 4 have shown, physical contact between hotel guests and Hilton employees can potentially be cut to 0 when Hilton guests use the app. At the same time, it also improves the automation of business processes, possibly supporting the strategy of cost management. Therefore, the Hilton Honors App proves that the hotel industry has tried to react to changing customer demands. As the hotel industry can potentially offer a physical contactless get-away if the check-in process is automated, this seems very relevant to attract customers again. However, as the hotel industry also relies on activities, such as swimming pools, spas, and business conferences, which do not offer a similar solution, it is clear that the industry is far from done innovation-wise. It will be a challenge to develop these innovations while trying to apply customer intimacy, without decision rights for the business units that best understand these needs.

The proposed business model regarding renting out the rooms as temporary office space using the Hilton Honors App brings several risks. But by doing this Hilton can change their targeted customer segment from tourists to the local business market and maybe later also the global business market. However, renting out their rooms through their already existing Hilton Honors App brings cyber risks, some which already existed, but are now amplified due to more intensive use of the app, and some new risks. In short, those risks are key Bluetooth signal interception, key interception when shared, a data leak, and unauthorized access to someone's Hilton Honors account. The first two risks mainly cause unwanted access to parts of the hotel and a private room. The latter two are mostly about unwanted access to data. Overall the risk scores are not above 10 and thus will be manageable. However, it will be a continuous operation to mitigate the risks.

CONCLUSION

In conclusion, the hospitality industry seems to be heavily hit. As the strategy of Hilton Worldwide changed from growth focus to cost management, the organization had to change its IT governance structure for business application needs and IT investments from federal to business monarchy. Hilton was cutting costs drastically to survive, however they tried to do this in a way by innovating and changing their business processes (Hilton Worldwide, 2020b). While normal resilience studies mainly focused on the capability of a firm to absorb the impact of a disturbing event and return as quickly as possible to the original 'stable state', a new study challenged this and argued that companies should not always try to return to their stable state but be more adaptive to the new circumstances created by such events (Conz & Magnani, 2020). Hilton is already promoting their application to become more adaptive to the health concerns customers may have. The app can be used for self-check-in and check-out. However, it also creates a possible new business model, by which the app is used for renting out rooms as workplaces. As this can create more adaptive resilience, a shortcoming of this new model can be pushing new innovations too fast. Wanting to implement applications too fast to a larger group, without thoroughly testing them creates new risks (e.g. overload of the system, cyber security risks) can be dangerous. Shortcomings of this study were that due to the recency of this event, not much academic research has so far been published. This required some alternative ways of conducting research and also required us to think more outside the box and use other sources to our advantage. For this research there are no real 'after' COVID-19 impacts that

could have been studied as we are still in the middle of this crisis. This research has added a preliminary analysis on the digital transformation. For future research, researchers can analyze the impact of COVID-19 on the hotel industry when the crisis is fully over, as this will generate the most reliable results. This way, the true digital transformation of the hotel industry can be studied.

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