The Emirates Academy

The Smart Hotel: a contactless and digital journey towards sustainability in Malta

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Submitted to:
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In partial fulfilment for the requirements of the Degree of
Master of Business Administration

To Margherita,

My happiness begins with your smile…

DECLARATION

I, *Patrizia Negro*, declare that this is an original piece of work, produced entirely by me, and that all source material has been appropriately referenced. In addition, I attest that no portion of the work referred to in this thesis has been submitted in support of any other course, degree, or qualification at this or any other university or institute of learning.

Student's signature

Abstract

Internet- and Cloud-based systems are transforming the way businesses operate; this is interesting also for the hospitality industry, though with limited application to date due to many variables. Advances in the smart technologies like Internet of Things (IoT), Artificial Intelligence (AI) through Information and Communication Technology (ICT) provide the opportunity not only to optimize hotel operations but also to create personalized services and experiences. Prior research discussed extensively the numerous advantages of smart technology for hotel guests, however the barriers that stop hotel stakeholders from implementing it in hotels is a grey area that has not been sufficiently explored yet. The study aims at analysing the above-mentioned uninvestigated area and identifying the gap between the literature review and the hospitality industry in Malta. Besides, the research study contextualizes the hospitality industry in today's modern and smart era and proposes a Smart Hotel business model category to rejuvenate the current hospitality industry processes and to progress towards more sustainable practices in hotels in Malta. In order to accomplish the goal of the study, a qualitative research method was used consisting of two surveys: one addressed to the general public working within the tourism sector and the other one to professionals in the hospitality industry. Interviews were conducted with Hotel Senior Managers, IT suppliers and Malta Tourism Authority (MTA) and Ministry of Tourism (MOT) representatives. Through the findings it was possible to answer the six research questions and correlate them with the academic literature to identify the gap between the academia and the stakeholders' perspective on Smart Hotels. It appears that all hotel stakeholders defined a smart hotel as highly dependent on automation and digitalization. Currently there is not yet a category or indicators for smart hotels in Malta. Nevertheless, most of the participants believe that the introduction of a Smart Hotel would add value to the tourist experience and, at the same time, it would elevate the hospitality industry offer and overall, Malta as a destination. With regards to the challenges to Smart Technology implementation, the research findings reveal that cost, return on investment (ROI), time and resistance of owners and stakeholders are the key barriers. On the contrary interoperability and connectivity, security and privacy risks, and employee turnover were not mentioned

by the participants as threat motivators. Instead, the smart technologies' integration is perceived by both employees and stakeholders as a strength, as repetitive tasks can be automated and people can focus more on guests. The study's observations indicate the potential of the Smart Hotel business model in the hospitality and tourism industry, as a source of experience co-creation and promoter of environmental sustainability.

Keywords: Smart Hotel, Smart Technology, Sustainability, IoT, A.I., Malta.

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Chapter One: Introduction

1.1. Introduction

The 20th century witnessed the advent of the fourth industrial revolution with the emergence of automation, robotics, artificial intelligence (AI) and the proliferation of Information and Communication Technology (ICTs) in many business sectors, including the tourism and the hospitality industry. Undoubtedly, the recent pandemic has accelerated the digitization process for the hospitality industry.

The Smart Technology within the hospitality industry refers to the application of the term "smartness" to the hotel services. Some of the new smart applications in hotels feature in-room automation systems, delivery robots, e-kiosks and AI translated in AI digital signages, chat boxes or virtual voice commands. The new technology is used in hotels to streamline processes while minimizing manpower (Li *et al*., 2019).

The new cutting-edge technology is continuously progressing and has revolutionized the way hotels operate. This change reflects also in the market demand where the consumers are gaining increasing power and control. (Alt and Klein, 2011). The consumers behaviours and preferences, especially among Gen Z, are shifting towards digital services: they expect information to be available through a "swipe up"; they are used to book "online" and be actively present on "social media". They are empowered and technologically independent in the way they plan their journey and seek information, without the physical assistance of somebody (Buhalis and Law, 2008). The popularity of social media, in fact, has completely changed the relationship between the guests and the hoteliers. The "online presence" in reviews and ratings has become determinant in people's traveling decisions. In this scenario, it has slowly emerged the idea of the "Smart Hotel" as a lodging operation that actively makes use of advanced technologies to gain market competitive advantage while improving management effectiveness and overall functioning efficiency has slowly started to emerge.

The development and spread of this type of advanced technology is giving to the hoteliers the opportunity to upgrade their services and use these high-tech solutions to pursue sustainability, create more memorable experiences for the guests, and taking the service personalization a step further. As a matter of facts, it has become paramount for hotels to adapt and engage with the new trends to succeed in today's era (Pine *et al*., 1999). This is especially in the post-pandemic scenario, where every effort needs to flow into reinventing and revitalizing the hospitality industry through

digitalization and contactless actions (check-in, payment, room entry) via AI and IoT technology to have quality products, sustainability, increased awareness, guest satisfaction, motivated employees and rewarded employers. All this is meant to contribute to making Malta a leading smart and sustainable country in Europe.

Nonetheless, the opportunity comes with barriers due to the limited "know-how" on the strategic application of smart technology in the hospitality business (Gretzel and Jamal, 2009). The support of key people in decision-making and stakeholders is fundamental for the implementation of smart projects. Even though the term "smartness" is not new to the academia, and its numerous advantages have been discussed thoroughly for many years, it is also true that the stakeholders' knowledge levels and the challenges to its implementation have been under-investigated.

Traditionally the hotel's priority is to provide a quality service to their guests; hence they place great emphasis in delivering a high customer service. With the increasing demand of information technology (IT) from both customers and IT developers, hotels are also adopting new IT facilities to increase their efficiency, improve the handling of routine operational problems, reduce costs, enhance the customer satisfaction and personalize the guest experience (Camison 2000; Siguaw *et al*., 2000; Law and Jogaratnam, 2005; Cobanoglu *et al*. 2011).

However, while other businesses are leaders in innovation and technology has spread at a fast pace, the hospitality sector follows with hesitation and uncertainty (Cho and Olsen, 1998; Law and Jogaratnam, 2005). According to Gamble (1988), such slow reactivity is what causes the hospitality industry to lag behind other industries in IT applications and, in turn, to be less competitive in the market. Furthermore, evidence has proven that there is limited technical understanding in IT among most of hotel decision makers that inevitably leads them to be sceptical about the value of investing in IT. Likewise, Connolly *et al*. (1998) stated that due to the low competence in IT amongst the hotel professionals, they are more likely to be resistant to the change as they fear that the new technologies will prevent them from providing personalized services to their hotel guests. Aside from that, there is the factor of "high perceived cost" on technology implementation which prevents organizations to move forward. Another concern is that technology requires frequent update and upgrade. With the ever-changing technology, the purchase may become already outdated by the time it is installed. In this regard, DiPietro and Wang (2010) have identified the return on

investment (ROI) and the longevity of IT items as the key issues that slow down the adoption of ICT applications in hotels as opposed to other industries.

A survey on IT applications conducted in Hong Kong Hotels in 1997 by Law and Au (1998), revealed how there has always been a gap between hotel managers and IT professionals that explains how hotels do not fully exploit the IT facilities. This often resulted in parallel conversations where hotel managers talk about service quality, marketing strategy and cost control, whereas IT professionals discuss computer networks, operating systems, and programming. Luckily, with the progress of new technology such as blockchain, and the metaverse software technology, as well as with the consumer demand for more and accurate information together with the ICT reshaping the services within hotels, the hospitality industry is expected to experience a major revolution (Frew, 2000) and to increase its smart technology at a faster pace.

Hotel stakeholders are key people that have a strong influence in decision-making processes in technology adoption. They are the ones that will need to justify their purchasing choices; therefore, it is vital to understand how much they know about such smart technology. If they do not know what is implied by the term "smartness" and what "Smart Hotel" means, it is extremely unlikely that they will implement smart technology in the hotels where they operate.

1.2. Research Objectives

The aim of this study is to explore the above-mentioned investigated area, by attempting to define the "Smart Hotel" category and outline the potential of such a new business model in the hospitality industry. The researcher aims at bridging the gap between the academic literature on smart technology and the hotel industry in Malta.

The study expects to address the underlying research questions as to "how" and "whether" smart technology can impact the hotel's profitability and "what" is preventing stakeholders from implementing it. The objective is to standardize "Smart Hotels" in Malta and shed light on the use of technology to drive sustainable development goals in hotels.

The study first assesses the current academic research on the topic of smart technology applications to the hotel business. It then moves forward to outline the research

questions and the research method. Finally, it discusses limitations and suggestions for future research.

1.3. Research Questions

The research questions will focus on the below topics:

Q.1 Is technology a significant factor that can impact the Hotel's profitability for hoteliers to justify expenses and investments in their properties?

Q.2 How much is the impact of IoT systems effective on Hotel's productivity?

Q.3 Will the introduction of AI influence the workforce and the employees' turnover?

Q.4 What barriers hoteliers face in implementing smart technologies?

Q.5 Which drivers influence whether a hotel adopts technology to pursue sustainability goals?

Q.6 Why should hotels in Malta become smart and focus on sustainable technology?

1.4. Research Methods

In order to answer the research questions mentioned above, a qualitative research design consisting of surveys and interviews was used to remedy the limitations and weaknesses from using any of these two exclusively. For example, using only the interviews with Senior Managers as research design could have provided a biased estimate as the rest of the employees' perspectives would be excluded, whereas the use of surveys allowed for the study to be extended to a bigger population within the tourism and hospitality sector.

1.5. Conclusion

The study is organized into six chapters. The present chapter introduces the topic and the research questions. Chapter 2 presents the literature review about the subject following the initial introduction on the ICT and the vast range of IT applications within the hospitality industry. It then moves on to elaborate the challenges of IT

implementation and then explores the “Smart Hotel” business model and the indicators of smartness and sustainability. Chapter 3 follows with the research methods and sets out ‘how’ the research was conducted and “why” a qualitative research method was chosen. Both concepts of qualitative and quantitative research designs are explained as well as the advantages and disadvantages of both methods. In Chapter 4 the findings of both surveys and interviews are presented and analysed individually. The findings were compared with the academic literature and discussed in Chapter 5. Finally, Chapter 6 presents the conclusions which comprise the key findings and general observations about the Smart Hotel proposal, the study’s limitations, and recommendations for future research.

Chapter Two: Literature Review

2.1. Introduction

The digital transformation has accelerated beyond all expectations and a number of organizations are jumping aboard the techno-wagon, especially post-pandemic. Most competitive businesses are reshaping the way of work and people are demanding new experiences and new added value. The hospitality industry is responding positively to the transformation but it still needs to become more agile in redesigning its services through smart technology applications. This chapter will explore the themes that slow down the adoption of smart technology in hotels.

In the literature review, the author will discuss the role of technology and its potential in the hospitality industry, the Information and Communication Technology (ICT) and Internet of Things (IoT) ecosystem, and identify the challenges currently being faced by the hoteliers in implementing ICT, IoT and Artificial Intelligence (AI). Furthermore, it explores how IT investments impact profitability and productivity, also looking at the definition of "Smart Hotel" and the relation between Smart Hotel and sustainability.

2.2. Smart Technologies in Hospitality Services

According to Worden *et al*. (2003), for a technology to be considered a truly smart technology, it should possess two key attributes: awareness of a situation and the capability of reacting to it. With the first, it is intended to look at the technology's context or environment, and the second refers to its capacity to sense the surrounding, thanks to big data analysis, machine learning, algorithms, artificial intelligence and enhancing its functionality; thus giving a better performance in efficiency, operating costs and endurance. Currently all smart technologies are faced with the same unresolved dilemma: the integration of both attributes, awareness and reaction, into one seamless system at a reduced cost and complexity.

The advances in technology led to the discovery of innovative technological smart solutions whose application within the hospitality industry could generate unprecedented opportunities. The new technology includes the latest financial developments such as blockchain as well as the Internet of Things (IoT). The IoT integrates systems like heating, air-conditioning, lighting and connects through the

multiple network devices such as TV sets, smartphones, or laptops, and then through access points and sensors to enable the exchange of data. The incorporation of the IoT-enabled devices provides the opportunity to optimize hotel operations and transform a generic room into a smart room where the guest can autonomously operate the room settings (Eskerod *et al*., 2019) (shown in Figure 2). The inclusion of the IoT technologies in hotels qualify them as smart buildings and consequently, contribute to the potential development of smart cities.

The IoT architecture prompts a personalized and localized service since the hospitality professionals can determine with more accuracy the guest preferences and behaviours (shown in Figure 3). In fact, service providers store this data in the guest folio and they utilize it to personalize offers to repeat guests or to "wow" guests during their stay at the hotel.

IoT specifically helps to increase the Back of House's (BOH) (i.e., housekeeping, front desk, food & beverage, etc.) efficiency as well as enabling green policies like the Rooms Energy Management System (REMS) which, connected to the Property Management System (PMS), allows the front desk agents to set the temperature remotely as soon as the guest checks-in (Bilgihan *et al*., 2011). Other energy-saving systems currently employed in many hotels include smart lighting systems and data-driven software like the Customer Relationship Management (CRM), the Enterprise Resource Planning (ERP), the Enterprise Application Integration (EAI) which are having a significant impact on industries (Ghosh, 1998; Kim and Mauborgne, 1999; Cachon and Fischer, 2000; Lumpkin *et al*., 2002). According to Olsen and Connolly (2000), the success of the enterprises will depend on 'how much' and 'how well' they know their clients, and how effectively they will introduce their products and services.

Guest interactions are migrating towards online and on-screen interfaces, called guest-facing systems. These include mobile applications, Point of Sale (POS) terminals, remote controls, and in-room tablets which capture how the customer perceives a business service feature (shown in Figure 1). Guest-facing systems should be seamlessly integrated into the guest journey from arrival to departure so as to provide a complete digital service experience. Guest-facing systems include, amongst others, automated check-in and check-out facilities, keyless entry, and control of in-room features. Some popular luxury hotel chains such as Hilton, Starwood and Peninsula Hotels offer some of these facilities to their guests.

Hotels and, in general, Hospitality Service Providers (HSPs), are also introducing in their daily operation, Augmented Reality (AR) and beacon technology systems. The AR technology can be used to provide guests with an immersive experience before they actually go on site; digitally guided tours, virtual in-room tours (i.e., décor, facilities, layout), live translation services for signages, interactive menus with dish previews and food allergy information, and even interactive table games in lobby points around the property. These services operate through sensors inserted into the appliances or devices, and can monitor movement during the daily activities at the hotel (Yick *et al*., 2008). The beacons can track the guest location and send personalized texts (Toedt *et al*., 2016). This is an impressive advancement for business and leisure travelers as, through text messaging, hotels can inform guests in real-time about events or changes in the event schedule or send recommendations on special offers at the Spa and from restaurants. The ability to reach hotel guests in real-time, tremendously impacts the guest experience and enables hospitality professionals to direct the guest flow to sites and venues that will profit them.

Nowadays smart technology is even being included in wearable items such as watches and shoes. These devices, whilst worn, capture the user body temperature, the heartbeat, the location and the fitness activities. An extreme extension of this technology are the wireless medical sensors that expand the data collection to organs within the body to the extent that the hosts can adjust the in-room temperature based on the guest body temperature, adjusting the lighting in the room based on the guest sleeping patterns, or they can suggest meal options based on the guest's desired fitness goal or medical conditions (diabetic guest or with heart disease) (Vermesan and Friess, 2015).

The sensors can detect whether a room is vacant or occupied for the scheduling of the housekeeping services, and therefore helping to improve the revenue per available room (RevPar) (Kansakar *et al*., 2019). In fact, BOH management systems can reduce the room's downtime and maximize the labour resources; deployment, which results in 10 to 20% payroll reduction. The same reasoning can be applied to schedule preventive maintenance for utilities such as elevators, pipes, automated doors, windows, before faults or malfunctions are detected through a physical inspection. Thus, automation and monitoring increases operational and managerial efficiency.

Figure 1. *The hospitality services state-of-the-art (Kansakar, Munir and Shabani, 2019).*

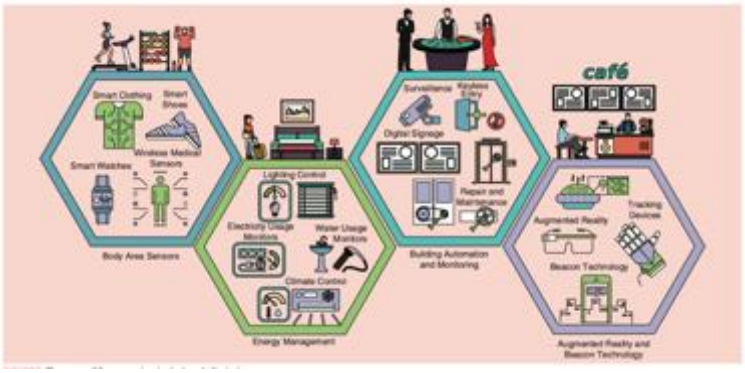

Figure 2. *The scope of future services in the hospitality industry (Kansakar, Munir and Shabani, 2019).*

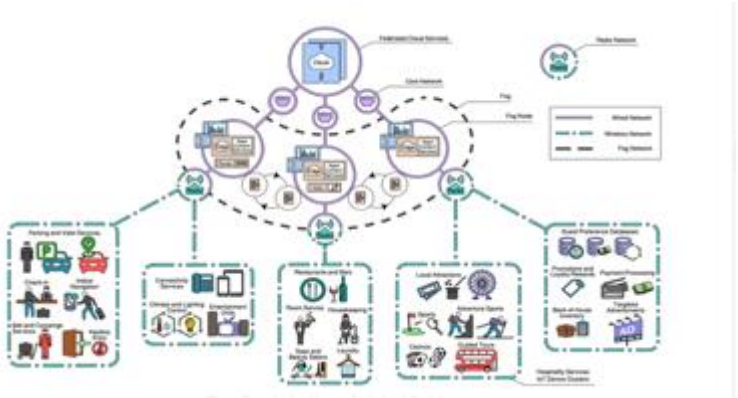

Figure 3. *Fog-assisted architecture for the hospitality industry (Kansakar, Munir, A and Shabani, 2018).*

2.3. Challenges associated with Smart Technologies

The Information and Communication Technology (ICT) development transformed the operation process and consumer's purchasing willingness in hotels.

Hotel stakeholders use technology to monitor their competitor's performance, maximize their revenue, expand the distribution network, improve their ranking on social media and set up competitive strategies. Hotel managers expect technologies to increase the profit in their establishments, to reduce labour costs, to improve efficiency in the daily operation and increase customer satisfaction (Buhalis and Law, 2008). Guests expect fast search for the best hotel, at a competitive price and with the newest cutting-edge in-room technologies (Leung and Law, 2013).

Smart technology increases the accuracy of the forecast and carries out the daily operational tasks in a more efficient way. However, the integration of the data between platforms and devices is still not fully automated and requires manual operation which results in higher error margins, inaccurate statistics, and inconsistent information. Therefore, academic studies suggest that applications should be interconnected and interoperable (Leung, 2019). The integration between information systems is crucial for the hospitality industry since hotels collect and store a tremendous amount of data from the internal (guest profile history, reservations database, marketing statistics) and external macro-environment (economic and political information) (Figure 4) (Ramos *et al*., 2015). This is essential especially for employees to exchange and share customer information from one department to another or even within multiple properties in a hotel-chain. The interconnection and synchronization of the ICT also represents the main challenge of the development and construction of smart cities. IT integration is directly associated to the interoperability, which refers to the ability of computer systems or software to exchange and make use of information.

As a matter of fact, researchers foresee that the next step of the smart technology will be the implementation of a smart city network, where sensors, installed around the city, collect data from the external contextual environment such as weather, road and airport traffic (Kansakar *et al*., 2018). This data, combined with internal data, can assist hotels in providing the guest with personalized service in advance and it can be integrated to the database of the hotel to achieve accurate revenue management solutions according to the hotel's needs (Leung *et al*., 2013).

Evidently, IT applications have the potential of upgrading the hotel operations and services in numerous advantageous ways; however, the academia identified financial, technological, and behavioural barriers that stop hotels from becoming 'smart'. Firstly, smart technology is expensive and hotel management finds it difficult to justify the expenditure without having an estimation on the return on investment (ROI). In addition, there is a cybersecurity issue connected to the IoT technology which represents a potential threat for both guests and hotels. Hackers can potentially access the hotel servers or guest smartphones and obtain guests' personal data or download viruses (Shabani and Munir, 2020). Secondly, some hotels may not be "ready" to receive the smart systems and therefore, changes to their present infrastructures and operation processes may be required; thus requiring an even bigger investment to apply the changes. This brings up the third point which is the existent gap between the sustainability awareness in hotel management and the subsequent preparedness to invest in IoT technology in hotels. Lastly, changes in general are not always welcome as they require people to move out of their 'comfort zone'. When the change consists in the introduction of smart technology, the barrier becomes even higher to overcome.

***Figure 4**. The technological challenges in the hospitality industry (Kansakar, Munir, and Shabani, 2019).*

2.3.1. IT applications

As stated by Tan *et al*. (2009), Information Technology (IT) can be defined as the application of ICT infrastructures to process and transmit information in order to improve the effectiveness of organizations.

The decision-making process of IT investments and the associated issues is crucial in analysing how IT applications can lead to profitability, and consequently to competitive advantage in hotels. Okumus *et al*. (2003) argue that the company's business strategy and IT projects should be coherent; the managers should persuade the owners that the IT investment plan will benefit the hotel's business strategy to justify the expenses and have their full support on the initiative. The findings of a study carried out in 2000 by Siguaw *et al*. (2000), on the adoption of Information Technology (IT) in U.S. hotels revealed that the U.S. lodging industry has opted to invest in technologies that improve the employees' productivity and maximize revenue rather than giving strategic priority to technologies designed to improve guest services. Siguaw *et al*. (2000) argue that the hotel type, size and whether it is affiliated to a chain or is an independent hotel, influenced the technology adopted. Budget and mid-scale hotels are more likely to invest in techonologies that increase efficiency during the operation whereas upscale and luxury hotels have more financial strength and are keener on investing in tech that enhances the quality of service to guests.

The type of IT applications as well as determining the areas of focus of IT investment are also significant aspects that need the attentive evaluation of the stakeholders (Okumus *et al*., 2003). According to Ham *et al*. (2005), the primary objective of IT in the hospitality industry is improving productivity. Several studies investigated the relationship between IT investment and its outcomes in terms of productivity and performance, however, with inconsistent results (Ham *et al*., 2005). IT applications can be broadly divided into back-office software which includes interfaces for finance and accounts, data management, security reports; and front-office software solutions mainly related to CRM and to the PMS. To these two categories, Ham *et al*. (2007) add two more categories for upscale and luxury hotels which are restaurant and banqueting management systems and guest-related interface applications. Moreover, different customer segments may have different requirements (Victorino *et al*. 2005). For instance, business travellers may expect pre-check in, smart check-in and check-out, digital invoicing; whereas leisure travellers may require more in-room high-tech comforts such as high-speed wi-fi, e-books, tablets, smart TVs, surround sound speaker systems, docking stations, laptops or tablets. Incentives and conference hotels are expected to have the latest

High-Definition (HD) display screen and touch screen devices to control temperature and lighting.

For these reasons, it is vital that the stakeholders plan and assess the costs of IT projects and their estimated return on investments. Specifically, the drivers of IT implementation in hotels are the increased transaction volumes such as improved operational efficiency, reduced costs, brand image enhancement, product quality and uplifting of guest experience. Porter and Millar (1985) highlighted how until not long ago, information technology was treated by most managers in different industries as a service support and it was generally delegated to IT or Electronic Data Processing (EDP) departments. Presently though, things are evolving, and it is imperative that managers understand that IT is more than just computers, but it holds and processes all the data a business generates. They must understand the implications of the new technology and how, if strategically deployed, can create sustainable competitive advantage. Porter and Millar (1985) further explain how and why IT is impacting the way companies operate internally and their relationships with suppliers, customers and competitors. This is especially important in view of IT expenditures. The lack in 'know-how' results in stakeholders following trends; usually without considering the characteristics of their properties and inquiry into as to whether a given investment in a specific area at a certain financial period is the right one. Therefore, according to Farrell *et al*. (2003), companies tend to spend on IT inefficiently and argue that, knowing when investing into an innovation, is as important as 'how' and 'what'. Knowing the right time for the IT investment will ensure that the prerequisites for it are in place before the IT initiative is launched. Therefore, companies that make big investments before knowing the internal capabilities and without having solid fundamentals may easily waste money. Farrell *et al*. (2003) conclude that, it is how the IT project is chosen, installed, and used that can lead a company to have competitive advantage rather than the technology itself. Consequently, it is advisable that stakeholders seek participation and input from different operational areas and management levels when investing into IT projects to gain support, resources, and fight resistance to change.

Taking into consideration what has been discussed so far, even though hotels often mention improved productivity as one of the leading reasons for investing and implementing Information Technology, there is no back up with empirical data to support such statement. As a matter of facts, David *et al*. (1996, p. 65) cite Roach's

'productivity paradox' (1991, p. 84) which refers to the fact that service industries were spending more on IT but paradoxically their productivity levels were less than other industries. Roach's (1991) work was challenged by several researchers who tried to measure productivity through various models. However, the outcomes were inconsistent as it resulted that each model provides a different perspective on productivity. Brynjolfsson and Hitt (1995), highlight that, especially for the service industry, there are many variables which affect productivity. Besides that, the data in most models refers to a specific point in time, hence it cannot be generalized. Therefore, the outcomes from productivity measure models are not trustworthy as they may overlook the impact of technology on productivity and consequently, negatively perceive the IT implementation. For instance, Brynjolfsson and Hitt (1995) evaluate the hypothesis that the productivity level within the front desk department is measured on the number of check-ins and check-outs performed in a certain period at reception and compare it with the number of automated check-ins and check-outs done at e-kiosks installed in the lobby. The outcome is that the volume of transactions increases in the machines and decreases at the front desk. Additionally, the machines will most likely process only guests whose check-in and check-out is smooth as opposed to those with questions or folio problems who will instead go to the front desk. Consequently, the fact that the receptionists will take long to resolve each issue, it results in less transactions processed per hour, which leads to a perceived lesser productivity and in turn, a negatively perceived impact of technology.

Nevertheless, according to David *et al*. (1996) evidence proves that Roach's productivity paradox is founded as industries consciously persist on implementing technology for the increased benefits in customer satisfaction more than for increased productivity. They argue that IT expenditure is a risk expenditure as it does not provide an immediate and 'smart' economic benefit to the companies. Therefore, the knot between technology and productivity is still untangled and more research that considers the benefits of technology, other than its productivity, is necessary to resolve the productivity paradox dilemma in the hotel industry.

2.3.2. Cyber Security Threats associated to the IoT

As anticipated earlier, technology advances are incredibly advantageous for the service industry, nevertheless IT developments also bring some challenges, especially concerning the security and privacy of the information stored within the database of a hotel. In fact, the guest data must be stored securely to avoid data breach and data leak. Guest-facing systems (in-room tablet, cell phone, kiosk, POS terminal etc.) are the most susceptible to suffer security attacks. To prevent data losses, big organizations usually have robust security measures in place. IT departments monitor the computer networks from countless security threats, such as frauds, thefts, hacking, viruses, system failures, as well as risks caused by physical elements such as fires and floods (Shabani and Munir, 2020). In IT terminology, a theft occurs when an attacker intentionally steals the organization's information and uses such confidential trade information for another business without authorization. A fraud transpires when an attacker deceivingly connects to a computer with fraudulent intentions. The article 'Cyber security threat actors' (*Cyber Crime, Security and Digital Intelligence*, 2016, pp. 173–182) reports that another major threat is represented by the Wi-Fi, since nowadays hotels offer free Wi-Fi to their guests. If this is not secure, hackers can monitor the guest traffic on the Wi-Fi and use that to steal their private information. Moreover, hackers can circulate updates for popular software like Adobe Reader. This is very popular as typically the users tend to 'click' on the updates which instead contain the malware that hackers use to obtain any important data from their smartphone or computer.

Attack attempts though, can come from both outside and inside the organization. This is true especially within the hospitality and tourism industry where there is a higher turnover rate in comparison to other industries. In this case, authorized users abuse the privileges given to them or try to obtain additional information without authorization. Nevertheless, there are Information Security Systems (ISS) whose main scope is ensuring confidentiality, integrity, and availability. They protect valuable data from disclosure or damage attempts through several methods: user identification and authentication, biometrics, encryptions, and firewalls (Cobanoglu and Demicco, 2007). Digital Identifiers (IDs) are electronic computer systems used to uniquely identify the user through the assignment of a user key in asymmetric cryptography. An Intrusion Detection System (IDS) detects any suspicious intrusions happening in a

computer system or a network and effects an automated denial of the attack by making the organization system unavailable. Firewall is a software or a physical device that monitors the network traffic flow or the traffic between devices such as computers, tablets, phones, etc. Another method that provides confidential security service is the encryption which converts the information into secret codes to hide its meaning, making it very hard or impossible to understand to unauthorized members. Biometric technology utilizes body features such as fingerprints, voice recognition or retina identification to verify and authenticate the user. Other typical techniques are access control and vulnerability assessment scans that, respectively, restrict the usage of the system only to authorized users and alert the administrator in case of potential vulnerabilities.

Additionally, hotels should have a secure network to prevent harmful intentions from hackers such as accessing guest devices connected to the network and gaining sensitive and confidential information (i.e., financial information, user accounts information etc.) (Kansakar *et al*., 2019). However, it is worth mentioning that these security protocols require significant and expensive computing resources. Apart from IT, hotels can also adopt effective prevention measures to mitigate the risks of data breaches. All hotel users and staff should be made aware of practices relative to cyber security. In fact, according to the academics, if the personnel are trained on what sources of information can be trusted and they have basic knowledge about secure and unsecure emails and websites, the risk of such incidents would be lower.

2.4. Definition of "Smart Hotel"

The term 'smart' is commonly associated with economic categories and behavioural or business performance goals. 'Smart' indicates the mental ability of being intelligent and bright, however, the SMART acronym has become a guide to set targets and increasing the chances to achieve what we want in life by clarifying our ideas, focusing our efforts, and using the time and the resources we have productively. While its criteria are commonly attributed to Peter Drucker's Management by Objectives (MBO) approach, the first use of the term we know about occurs in *Management Review* by George T. Doran in November 1981. After that, Professor Robert S. Rubin (2002), in an article to *The Society for Industrial and Organizational Psychology* stated that, SMART has come to mean different things to different people, therefore, the

goals need to be specific, measurable, achievable, relevant and time bound. Nowadays, the term is often used as an attribute to new technologies and devices. Even physical objects of everyday use such as cars, fridges, TV sets, smartphones, or laptops, react to changes in the environment when connected to a network. The "smart objects" are usually more user-friendly, intuitive, safe, and cost effective; thus, they generate higher benefits than other solutions which are exempt from the SMART attribute.

From the economic perspective, the academics analysed the "Smart Organization" utilizing the intellectual capital theory and the resource-based theory of an enterprise. According to the latter, the intellect is the most important resource of an organization (Jeremen *et al*., 2016) and decides on the implementation of the other resources. Similarly, in the intellectual capital theory, the people are considered as vital factors in creating added value as well as deciding about implementing and launching innovations. In this respect, Brilman (2002 as cited in Jeremen *et al*., 2016) considers a smart organization a "learning organization" because it builds its future development on the ongoing growth and competencies of its employees. The learning enterprise is based on the grounds of Senge's five disciplines (Senge 2000, as cited in Jeremen *et al*., 2016). According to Brilman, (2002, as cited in Jeremen *et al*., 2016) to increase knowledge there must be a permanent exchange of information amongst the company, the employees, and the environment. This is currently carried out in smart enterprises using ICT, business intelligence applications, cloud and business analytics mobile solutions, data visualization and other possibilities offered by the IoT. These tools allow the enterprises to increase the level of decision accuracy, improve the effectiveness of management, enhance profitability, and ultimately help to examine the perceived performance of the "smartness" on customers' behaviours (Kim *et al*., 2020). The smart organization is therefore perceived as a knowledge-based and learning enterprise that takes advantage of the progress in ICT and IoT in its management processes and operations promoting a sustainable development.

Specifically, in the case of Smart Hotels it is worth noticing that the term is generally used more by practitioners than theorists since Smart Hotels have not been fully commercialized yet. For this reason, the idea of a Smart Hotel does not stand for a theoretical concept, but it is rather a business model which englobes cutting-edge technologies to obtain operational excellence and meet the expectations of the travellers of the future. Therefore, from the practitioner's standpoint, the Smart Hotel can be defined as a hospitality business model whose systems are technologically

integrated and whose functioning depends on ICT and on the exchange of data between the internal and the external environment. A Smart Hotel is equipped with smart technologies that aim at optimizing the hotel management system relative to security, capacity, and efficiency, besides enhancing the guest experience. Moreover, a system of codes, biometric recognition and beacons allow for monitoring and identification of people when entering the room or the building. A control platform can monitor the capacity of meeting rooms, lidos, fitness rooms or restaurants and coordinate the manning levels. Through automated systems such as the lightning, the heating, and the air conditioning, the consumption of utilities can be monitored. This is possible thanks to sensors placed in different parts of the building that continuously send data to an interface. The data is stored and processed into information that the hotel personnel utilize to personalize the guest experience and work on analytics for marketing and budgeting purposes. Common attributes of a Smart Hotel are broadband internet, data-driven systems and smart devices, together with an effective policy to monitor ICT dissemination and a technological unit responsible for it. As a matter of fact, Smart Hotels are ahead of other enterprises, in terms of implementing environmentally sustainable systems. The idea of building Smart Hotels with an effective implementation of new ICT in their functioning, is currently carried out in Europe, particularly in Poland, Denmark, Germany, and Austria, together with Smart Hotels worldwide that include: Yotel chain, Henna Hotels, and Alibaba's Flyzoo Hotel – Hangzhou. The common characteristic of all these hotels is that they provide the minimum necessary to eliminate other unnecessary or extra amenities.

- *YOTEL Hotels*

The YOTEL chain redefines hospitality in the modern sense by using a cutting-edge design to create small but comfortable and smart rooms for independent and tech-savvy travellers who appreciate time and efficiency. YOTEL hotel rooms feature Smart Beds that can be fully adjusted from a couch to a bed by simply touching a button, adjustable mood lighting system and rain showers, USB points, contactless check-in via self-service stations, fast Wi-Fi, smart TVs, keyless entry and resident robots on site to deliver amenities and mingle with guests in shared meeting spaces.

***Photo 1**. YOTEL Amsterdam bedroom (2022)*

***Photo 2**. YOTEL Miami Lobby (2022)*

- *Henn na Hotel*

Nowadays there are 20 Henn na Hotels across Japan, situated near train stations or popular attractions, however, the first Henn na Hotel opened in 2015 in Nagasaki. It holds the Guinness World Record as the first hotel whose staff are robots, whether these be an animatronic receptionist or a human-size T-Rex dinosaur.

The Henn na Hotel is renowned for being a pioneer in design and technology evolution. In fact, 'Henn' in Japanese means 'to change'; and here it is a change towards a future where robots work in harmony with human beings. Plenty of delightful surprises await the guests when checking in at Henn na Hotel with the scope of providing them with a unique experience. Each Henn na Hotel room features LG Styler closets that freshen the guest clothing, a digital in room-concierge that can turn on and off the lights, set the alarm and check the weather through a voice command, a 'radiant panel' air conditioning system using electromagnetic waves to transfer heat and keep the room perfect temperature, motion sensors that automatically shut the lights off when the guest leaves the room, keyless locking and entry through face recognition, a clock room with an automated robotic arm and a moving robot that delivers the luggage to the room.

In 2021, Henn na opened its first hotel in the in New York (NY), United States, symbolic of New York City's (NYC) evolution. Differently from Henn na in Nagasaki, where there is no restaurant on site or room service, Henn na NY offers luxurious amenities, dining, and guest services for a more elevated experience.

Photo 3. *Porter Robot Henn na Hotel (2022)*

Photo 4. *Check-in Henn na Hotel (2022)*

Photo 5. *Robot Cloak Room Henn na Hotel (2022)*

***Photo 6**. Facial Recognition Henn na Hotel (2022)*

- *Alibaba's FlyZoo Hotel*

Alibaba's FlyZoo Hotel, known as the hotel of the future, is located in Hangzhou, China. The Hotel is innovative for bringing together technology and hospitality. Through the FlyZoo mobile app one can book his/her stay, as well as the preferred floor and the facing direction of the room. E-kiosks in the Lobby make the check-in process very simple and fast. FlyZoo features a range of AI services to create a convenient and seamless experience for guests. For example, guests can choose to use facial recognition rather than key cards to access the room. The FlyZoo Hotel has 290 rooms, in each of which is a TMall (Taobao Mall) Genie smart assistant that assists the guest to adjust the temperature, the lights, the curtains, and the TV simply through a voice command; also functioning as a 24/7 personal butler. For example, the guest requests by voice command a bottle of water and this is delivered by a Fliggy robot. A passcode is sent to the guest via text to open the tray to collect the drink. The robots deliver other items as well as the meals. The gym offers some fun digital experiences too. Upon departure, the guest can simply pack and leave without having to queue at reception to check-out.

***Photo 7**. Robot room service Alibaba's FlyZoo Hotel (2022)*

2.5. Sustainable Development Indicators (SDIs)

Sustainable Development has been at the core of the European treaties and at the heart of the European policy making and economic processes for a significant while. The European Commission's commitment is firm to pursue the 2030 Agenda and its 17 Sustainable Development Goals (SDGs) (shown in Figure 5). The SDG document provides the umbrella for all EU economic, social, environmental policies and funds, with the ultimate scope of improving the quality of life and well-being of the present and future generations. The 2021 edition constitutes the fifth publication of Eurostat's (the Statistical Office of the European Union) regular reports that monitor the progress of the European Union (EU) towards reaching the SDGs. This is assessed based on a set of 231 Sustainable Development Indicators (SDIs) (in the global framework, the total number of SDIs is 248, however 13 indicators repeat under two or three different targets; (the list is available on unstats.un.org/sdgs/indicators/indicators-list) structured along the 17 SDGs and selected according to their relevance from an EU perspective. The indicators serve to provide accurate answers to questions on whether there was a reduction in EU greenhouse gas emissions; or whether there is a trend towards more sustainable consumption patterns, if the life expectancy increased etc. The themes of the SDIs are socio economic development, sustainable production and consumption, social inclusion, demographic changes, public health, climate change, sustainable transport, natural resources, global partnership and governance. The monitoring report provides statistics and trends, based on specific quantitative rules, related to the SDGs in the European context, over two periods: the short-term (a period of five years) and the long-term (a spam of 15 years). According to Paolo Gentiloni (Commissioner, European Commission Responsible for Economy and for Eurostat), in *Sustainable development in the European Union* (edition 2022, Eurostat), the monitoring report is the EU's latest contribution to the debate on the future of Europe; it includes the actions that are necessary at local, national, and European levels, to achieve a better and more sustainable future for Europe and the world. Mariana Kotzeva, (Director General of Eurostat) in *Sustainable development in the European Union* (edition 2022, Eurostat), added that the 2021 monitoring report is an inspiring document for European citizens, policymakers, businesses and researchers to become more resilient towards future challenges, especially post COVID-19 crisis

(https://ec.europa.eu/eurostat/documents/3217494/14665254/KS-09-22-019-EN-N.pdf/2edccd6a-c90d-e2ed-ccda-7e3419c7c271?t=1654253664613).

***Figure 5**. Sustainable Development Goals (Statistical Information on the 2030 Agenda in Malta, 2021)*

2.5.1. Sustainable Development in Malta

In Malta, the first attempt at sustainable development was the implementation of the Planning Act of 1992. In 2001 the National Commission for Sustainable Development (NCSD) was formed, whose role was to advocate sustainable development in all sectors and to pursue further advancements. The NCSD proposed a sustainable development strategy for Malta for the years 2007-2016 that focused on five main areas: the environment, the economy, the society, the implementation, and cross-cutting issues. In 2018, the Maltese Government undertook the project of developing a new sustainable development strategy and action plan with a prospect up to 2050. Therefore, a 'Vision Document', aligned with the 2030 Agenda, was published with the aim of filling in the gaps in the production of statistics for the SDIs by improving the coordination between the National Statistics Office (NSO) and other entities producing statistics, as well as the methodological procedures to ensure high-quality results. In fact, Etienne Caruana (Director General NSO, National Statistics Office, Malta) in *Sustainable Development in Malta* (2021), argues that Malta's ultimate goal is to actively participate in global reporting providing reliable statistics related to Malta. Despite all the efforts, Prof. Albert Leone Ganado (Chairman NSO) in *Sustainable Development in Malta* (2021), explained that Malta still lacks a strong national statistical system, and thus the statistics, as well as the coordination of data from various sources, is either considerably limited, or not available and inconsistent, which makes it difficult to compose trends (nso.gov.mt) (https://nso.gov.mt/en/nso/Media/Salient-Points-of-

Publications/Documents/2021/SDG%202021/SDG-2021.pdf). Figure 6 shows a statistical overview of the status and progress of Malta towards the 17 SDGs, based on the EU SDG indicator set.

Figure 6. *Presentation of Members States' status and progress (Sustainable Development in the European Union, 2022)*

2.6. Relation between Smart Hotels and Sustainability

In recent years, the public sensibilization towards sustainability has increased and studies found that the adoption of "green practices" is a topic of interest to customers to the extent that they take it into consideration when evaluating hospitality options (Millar and Baloglu, 2011). Likewise, an increasing number of hotels are responding to the customer's concerns, and they are engaging in sustainability initiatives to address environmental issues.

The adoption of IoT technology is a means to optimize energy consumption and to increase the guest's comfort as they can control the heating, air conditioning and lighting systems. For instance, occupancy sensors can provide data and alerts to the hotel management to monitor occupancy fluctuations and regulate energy consumption thanks to sophisticated machine-learning algorithms that analyse thermodynamics, local weather patterns and peak demand loads in real-time, throughout the year. Studies carried out by Shaikh *et al.* (2014), have demonstrated that smart-energy management systems can reduce hotel energy costs by up to 20 to 25% and generate record payoff between 12 and 24 months. Similarly, smart lighting systems allow hotels to set preferred times and improve overall energy consumption. From a control panel, the management could monitor the energy wastage according to

real-time changes in occupancy (Harish and Kumar, 2016). IoT can therefore be used for predictive maintenance to identify wasteful trends, prevent system failures, and reduce costs as the maintenance staff can be notified about an issue before this escalates and becomes more costly. For instance, a single leakage in the hotel can cost a lot in extra water consumption that occurs until this is detected and reported. Smart low-cost IoT enabled-water meters monitor water lines' levels and save water consumption. The academic literature reveals that the implementation of intelligent automation technologies in buildings could result in approximately 30% of energy savings, reductions in wastage and CO_2 emissions, thanks to fully integrated computer-based systems called Building Managements systems (BMS) that control, detect and monitor multiple facilities' services at the same time, such as heating, ventilation, air conditioning, lights and power systems, fire and smoke detection systems, alarm systems, Closed-Circuit Television systems (CCTV) and security systems, elevators and other equipment with sensors and meters (Eskerod *et al*., 2019). Even though the use of IoT to pursue sustainability includes a significantly high initial investment cost for stakeholders because of developments costs, subscription fees and usage fees, the value that IoT-enabled green manufacturing creates eventually leads to enhanced brand reputation through favourable guest responses, improved corporate image, increased loyalty and ultimately, increased profitability and differential competitiveness for the hotel (Molina-Azorín *et al*., 2015; De Leaniz *et al*., 2020). It is exactly for these reasons, that it is also very important to educate internal stakeholders, both managers and employees, on sustainability awareness promoting specific training programs on environmental protection and policies. The exploratory study conducted by Eskerod *et al*. (2019), shows that there exists a large gap between "sustainability readiness" and "IoT readiness". In fact, generally hotels are aware about sustainability issues, but the buildings are not ready to implement the new IoT technology, or the stakeholders are hesitant to invest in it as they are in doubt about its financial benefit. In this respect, Kim *et al*. (2017) have identified three research domains in the hospitality industry that affect the implementation of green practices: organizational, operational, and strategic domain. The organizational domain identifies internal and external factors which are necessary to implement green practices in the hospitality business. The most relevant internal elements include the company's size and its financial resources. Researchers have argued that large companies have more financial strength that allows them to make large upfront

investments to support green practices (Nicholls and Kang, 2012). Another internal necessary condition is the management commitment (Park and Levy, 2014). Scholars found that businesses that are more sensitive and knowledgeable about the topic are more proactive in terms of establishing green standards and striving for continual improvement as they recognize the benefits in investing in environmental initiatives. Instead, external elements are beyond the hospitality business' control, as these are mainly governmental regulations and geographical location which affect in large or small scale the hospitality operations depending on the level of the country or region and depending on the local government's commitment to the topic. The operation domain focuses on installing new systems and procedures related to green practices aimed at having a financial and marketing return: green practices would help save costs and increase the company image in the customer's eyes. The strategic domain investigates what are the effects on the stakeholders and consumers of the various strategies such as monitoring of economic performance, auditing green practices, and obtaining green certifications (Peiró-Signes *et al*., 2013).

2.7. Malta towards Smartness and Sustainability

Malta's economic development and the Maltese Tourism's Industry are evolving, not only because of the profound chaos and uncertainty wrought by the global COVID-19 pandemic, but also as a response to the need of increasing the quality offer in service delivery, optimized airline connectivity, accommodation mix supply, facilities and digitalization technologies. This is required to attract the "new tourist", one with a higher spending power to respond to the global competition's pressure of other service companies in the international market and to the upkeeping of the tourism product. Currently businesses are urged by society to adopt more sustainable approaches, to balance the economic growth with the social and environmental wellbeing, to recognize the climate change's impact and make efforts to reduce the carbon footprints.

These objectives and goals are at the base of the Malta's new Tourism Strategy proposed by the Minister for Tourism and Consumer Protection for the period 2021-2030 in issuu.com, (2021) (https://issuu.com/visitmalta/docs/maltatourismstrategy_2030_v7/1).

The three principles on which the Tourism strategy is built are: recovery, rethinking and revitalizing (*Recover Rethink Revitalize, Malta Tourism Strategy 2021-2030*, 2021). The document emphasizes the operational policies and legislations of the tourism industry and on a better understanding of the challenges to implement a long-term sustainable policy and the required solutions. The approach taken is therefore one that aims at rejuvenating the tourism industry by eliminating obsolete and unattractive elements and incorporating new and more modern concepts such as renovation, quality, investment, opportunity, rebranding, and others.

The Tourism Strategy elaborated by the Government and the Tourism Authorities is intended to be an action plan following the Malta Tourism Policy 2015-2020 whose fundamental principles were to increase the tourists' number, leverage the quality value across the entire supply chain, and reduce the seasonality issue.

Recorded evidence shows that the tourists are no longer satisfied with the existent weak tourism product, hence why the strong need for a recovery and for the tourism sector to adapt to the new realities (*Recover Rethink Revitalize, Malta Tourism Strategy 2021-2030*, 2021).

With regards to the use of smart and modern technologies within the tourism and hospitality industry, the Malta Tourism Strategy recognizes that the digitalization will improve the access to quality data and the exchange of digital information which will provide valuable knowledge to make better decisions and improve the local product. The investment in new technologies will offer more client centric services that will enhance the overall tourist experience. In addition, the document emphasizes on the importance of nurturing cross digital collaboration amongst public, private and non-profit organizations to maximize the local tourism offering and connect the visitors. It also highlights that investing in innovation allows a destination to be a pioneer in emerging sectors and be ahead of slower reacting competitors. At the seventh edition of the Mediterranean Tourism Forum (2022), Minister Clayton Bartolo stressed that sustainability should be a "modus operandi" and points out that "resilience" has become the new buzzword as well as the answer to the disruption challenge; by transforming challenges into opportunities. Typically, the very first reaction of most companies when facing disruption is being cautious; they usually raise barriers and repeat moves that worked for them in the past instead of extending themselves outward and seeking a deep change. Whilst they survive in this way, their approach keeps them in passive mode and away from actively shaping their future.

Johann Buttigieg, Executive Chairman of the Planning Authority in maltaprofile.info (2019), (https://maltaprofile.info/article/smart-planning-for-a-smart-country) also declares that Malta is planning to invest in new smart solutions in infrastructures and services in the coming years towards a smarter Country to improve the life and work quality of the people on the Island.
The hospitality tourism in Malta is therefore working to adjust and support innovative ideas to bring its environment to the next level.

2.8. Conclusion

The arguments raised on the topic allow the researcher to reach the conclusion that businesses must create new value, but they must do so not by focusing on the design of the product, but by reimagining how the customers can use their product to enjoya broader experience. For instance, the taxi service company Uber, did not change the vehicle but it fundamentally reimagined the mobility process and the travel experience: the way the customer orders and pays for the rides. Airbnb is another example of a service tool that became popular amongst travellers not because they redesigned the travel platform, but simply because they rethought how people can host and look for their preferred vacation accommodation, making it all about the mindset. Being innovative and different is challenging but it drives loyalty, it gives competitive advantage and better margins.

Chapter Three: Research Method

3.1. Introduction

This chapter will examine the methodology used to collect the data and how this is relevant to this project. The aim of the study is to define the "Smart Hotel" category and to understand whether hotels in Malta are familiar with the application of smart technology and "what" prevents stakeholders from implementing it. To pursue this aim, a qualitative research design was chosen, besides the secondary data retrieved from the academic literature.

3.2. Research Design

For this study, a qualitative research methodology design was chosen, and the researcher decided to analyse the data collected separately through the surveys and the interviews, and then compare the results to see if the outcome of the findings is the same or different. This method allowed the researcher to obtain an extensive explanation of the results which brought a broader response to the research questions. It was decided to opt for two types of online surveys to reach out to a larger audience. The first survey was addressed to the general public employed within the tourism sector, and the second was addressed to qualified professionals who work or recently worked within the hospitality industry. The qualitative research comprised also of semi-structured interviews to hotels or Operations Managers, to IT companies and to public entities. In the following section, the researcher will briefly define the main differences between the qualitative and the quantitative methods.

3.2.1. Quantitative Research Approach

The quantitative research method attempts to answer the questions that start with "how many", "how much", and "to what extent" (Rasinger, 2016). It gathers data in a numerical form which can be statistically visualized in graphs and rating measurements. According to Bryman (2012, p. 35), "quantitative research emphasizes quantification in the collection and analysis of data...". In other words, quantitative research, as opposed to qualitative research that interprets the actions of human behaviour, tries to quantify those actions, and translate them into measurable patterns.

Another aspect that underpins quantitative research is positivism as opposed to the interpretivism in qualitative research. Bryman (2012) claims that while in interpretivism, the knowledge derives from the meaning of events, in positivism instead the knowledge is obtained from empirical testing. Researchers like Weber (2004) and Richardson (2012) claim that person and reality are independent and that an objective reality exists beyond the human mind. The quantitative research relies on empirical investigation of observable phenomena and the methods utilized are statistics and content analysis of close-ended questions, multiple choice questions or a rating scale questions.

3.2.2. Qualitative Research Approach

According to Ritchie *et al*. (2018), defining qualitative research is very challenging. Since the methods and paradigms that are used in this approach are neither set nor objective, it goes without saying that it cannot have an established and absolute definition. Denzin and Lincoln (1994, p. 2) claimed that "Qualitative research is multi-method in focus, involving an interpretive, naturalistic approach to its subject matter". Corbin and Strauss (2015) also claimed that with the term "qualitative research" we can include any types of findings which do not derive from statistical procedures or quantification techniques. Corbin and Strauss (2015) go further by claiming that it can be relative to people's life, their experiences, behaviours and feelings, and it adopts a dynamic rather than a static overview of various realities. Flick (2014) added that the qualitative research is about how different people make sense of different issues and events in real life and stresses how the data collected is not based on numbers and statistics, but on texts and images. Even in Van Maanen's (1979) definition of qualitative research the focus is on understanding why and how certain behaviours are being carried out. Therefore, the term includes multiple perspectives about the 'meaning' rather than the 'frequency' of the phenomenon surrounding the research questions. Even according to Berg and Lune (2012), the qualitative research is a description of meanings and concepts. The data is collected through various instruments which are observation, open-ended questions, in-depth interviews and transcripts. Therefore, the researcher's approach in the data collection is interpretative and descriptive because it gives a full understanding of the research nature and the participants behaviour.

3.3. Data Collection

In this section, the researcher describes the data collection process and the instruments used to collect the primary data of the research study. The researcher provides detailed information about how the two surveys were compiled and distributed as well as explaining the importance of the semi-structured interviews to this study.

3.3.1. Online Surveys

Two surveys were compiled to address a larger and diverse population. The first survey was addressed to the general public employed within the tourism sector, the second was addressed to qualified professionals who work or recently worked within the hospitality industry.

The aim of both surveys is to collect exploratory information (i.e., qualitative information for the purpose of showing the level of understanding of smart hotels) as well as quantitative information to investigate the employees' perception of smart technologies applied to the hospitality industry. For this reason, some questions in the questionnaire addressed to the hospitality professionals were open-ended to give the respondents the possibility to express their opinion instead of providing multiple choice answers only. For example, in asking the employees why they perceive AI in their job as a strength or a weakness, a formal questionnaire would be limiting the discussion and prevent a full exploration of the employee's perspective; instead, in this way the employees were asked to elaborate on their reply and the responses were more extensive and diverse. On the contrary, in the survey for the general public, the questions were standard and were generally characterized by prescribed wording and order, to ensure that each respondent completes the survey and is prompted to reply.

For ease of reference, the surveys were coded as per table below:

The Smart Hotel addressed the hospitality industry professionals.	*Survey 1*
The Smart Hotel addressed to the general public working within the tourism sector.	*Survey 2*

***Table 1**. List of Surveys*

The surveys were distributed using Google forms and a total of 104 usable responses were collected. Data was collected considering different parameters: personal background, smart hotels and technology awareness, impact of smart technology on hotel profitability, turnover intention, and sustainability (please refer to Appendix 1 and 2 for the complete questionnaires). For this reason, each survey consisted of various sections.

Survey 1

The survey was composed of the following sections:

- 'Demographics': aimed at building a demographic profile of the respondents by collecting information such as gender, age, occupational and educational level.
- 'Hotels and Smart Technology': the participants were asked to provide their opinion on 'how' and 'whether' smart technology impacts the hotel's profitability.
- 'Smart Hotels and Sustainability': the participants were asked their opinion as to whether the Smart Hotel business model has the potential to drive sustainability.
- 'Efficiency and Productivity': participants were asked to share their view on 'how' and 'whether' smart technology impacts the hotel's efficiency and productivity.
- 'Human Resources': the participants were asked their perspective on the impact of smart technology on employee's efficiency and productivity.

The surveys were distributed to employees working in hotels in various departments (Front Office, Housekeeping, Maintenance, Reservations and Sales), after obtaining written permission from the Human Resources Manager to conduct the research. A total of 63 valid responses were collected.

Survey 2

This survey, different to Survey 1, comprised of three sections:

- 'Demographics': aimed at collecting the background profile of the respondents.

- ‘Hotels and Smart Technology’: aimed at understanding the level of knowledge about Smart Hotels and whether the respondents have positive perceptions or attitudes towards the application of smart technologies in hotels.
- ‘Smart Hotels and Sustainability’: aimed at understanding how smartness and sustainability are perceived in relation to hotels and Malta.

It was decided that the questions in the sections relative to the impact of smart technology on hotel profitability and turnover intentions were too technical and specific for this population sample and consequently, the answers would be given on the basis of assumptions rather than on experience on the job. Therefore, those sections were not included.

Additionally, the questions and the answers components in Survey 2 are different to those of Survey 1. The answers include a mix of checkboxes and matrices of choice. The questions have a prescribed format and are all closed, so the respondents would not think about how to articulate the answer in the text box, and it was easier for them to indicate their choice. A total of 41 responses were collected.

3.3.2. Semi-Structured Interviews

A total of 11 interviews were carried out. It was considered opportune that the interviews would have a semi-structured design as this approach allows to collect deeper and more elaborate responses to investigate the key issues in the study. It was decided that this was the best option to answer questions such as “why”, “how”, “what”, and to obtain more accurate and testable replies. An example is wanting to know how a general manager would define a Smart Hotel and whether they would classify their hotel as smart; and then asking to justify their reply through the “why” question. This type of interview allows more flexibility as the researcher can dig into areas of interest for the study subject as well as modify the questions and areas discussed throughout the interview. With this method the researcher was able to set a chat style interview rather than a formal one, where both the interviewee and the interviewer were talking freely and sharing views based on their experience.

The interviews were conducted with hotel senior management representatives, IT suppliers and public entities (Ministry of Tourism and Malta Tourism Authority). A

total of six Senior Managers, two of which work in 5-star Hotels, three in 4-star Hotels and one as a Technical Service Director in a luxurious hospitality holding at Emirates, all of which accepted to participate in the study. The reason for inviting a representative from an overseas Company to participate in the study was to provide a comparison between Malta and another country. When sending the interview invite, only Senior Managers of 4- and 5-star Hotels were selected because of the level of services and facilities that they provide. The target identified consisted of sources from 4-Star and 5-Star Hotels in Malta that are already, or are in the process of, developing ICTs. It was purposely decided to exclude boutique hotels from the research study because of their small and intimate size which allows them to offer an ultra-personalized service level.

To ensure that the data collected is pertinent to the research project, it was crucial to identify the right participants, in line with the purpose of the research questions. When picking the ideal participants for the interviews, there were key aspects which were guarded to make sure that what is required out of that specific person could be obtained and whether the person is the best to answer. For this reason, the selected interviewees are key-decision makers that are directly involved into the operation strategic planning and the daily operation of the hotel. The interviews to Hotel Senior/Executive Managers comprised of three main sections which have been categorized as follows: section 1 (general information about the hotel), section 2 (Smart Hotel and technology), section 3 (Smart Hotel and sustainability), (please refer to Appendix 3 for the interview questions).

The researcher also involved IT suppliers and technical advisors in the study as these are the ones who sell and give professional advice to the stakeholders on new hotel technology and advanced application systems (in-room entertainment systems, property management systems, communication systems etc.). The top managers of three software and hardware development IT companies accepted to be interviewed (Interview Questions are available in Appendix 3).

For this study, it was also important to ask the contribution of three C-Level members within the Ministry of Tourism (MOT) and the Malta Tourism Authority (MTA) who are involved in the Tourism Strategy or work within the licensing department, to further validate the researcher studies (interview questions are available in Appendix 3).

The data collection process was therefore affected on a purposive sampling whose selection was limited to a group of people and companies that were considered to be the most suitable to the study's objective. The invite was sent by email and, in one case, through LinkedIn; and all interviewees were asked to take part in face-to-face interviews or video calls. As this study focuses on the opinion of the stakeholders about the adoption of smart technology, the hotel's guest perspective was excluded.

Due to the high and varied number of participants to this study, an alphanumeric coding system was created to categorize each participant and the corresponding company (as shown in Table 2).

Hotel Participants	**Category**	**Position**
SM1	5-star	Senior Management
SM2	4-star	Senior Management
SM3	5-star	Senior Management
SM4	Holding of upscale and luxury hotels	C-Level
SM5	4-star – Case Study	C-Level
SM6	4-star – Case Study	Senior Management
IT Participants	**Company**	**Position**
IT1	Software	Senior Management
IT2	Hardware	C-Level
IT3	Hardware	Senior Management
MTA/MOT Participants	**Entity**	**Position**
P1	MTCP - Ministry for Tourism and Consumer Protection	C-Level
P2	MTCP - Ministry for Tourism and Consumer Protection	C-Level
P3	MTA - Malta Tourism Authority	Senior Management

***Table 2**. List of Participants*

Case Study

This research study also presents the case study of a 4-star Hotel in Malta. Holding D, (pseudonym to ensure anonymity and confidentiality) provides smart check-in and check-out solutions, digital entry codes to access the rooms and REMS systems. Additionally, Holding D follows a strict paperless policy, therefore all rooms feature Suite Pads, the registration form is completed on a tablet or mobile, invoices are sent by email, room directories, tourist maps and promotional material are available in digital form. The hotel invested in an entirely cloud-based PMS, a Global Management Solutions (GMS) tool and Housekeeping Software (HotSOS) with the aim of gaining competitive advantage whilst increasing the digitalization and personalization level. Two Senior Managers of Holding D agreed to participate in this study and accepted to be interviewed.

3.4. Data Analysis Method

In the framework of qualitative research, the researcher employed an abductive approach where initially determined questions were asked relative to the level of knowledge in smart technology and these were systematically combined by empirical observations from the existing literature. Nevertheless, the collection of primary data enabled to gather specific and real-time data relative to existing issues within the hospitality industry in Malta, as opposed to the secondary research which does not cater to the needs of the current social context. The surveys were instead conducted via means of google forms and the data was critically analysed and objectively interpreted by comparing it to the findings of the interviews and of the literature review.

Due to the extensive literature review on the topic, the researcher has mainly taken into consideration the sources that were published within the last 12 years because of the evolving and dynamic nature of technology.

The interviews were recorded, and an audio transcription software was used to convert the speech into text to ensure reliability. This was then proofread and supplemented with notes to ensure that the data collected was an accurate reproduction of the participants' opinions. Consequently, to start answering the research questions, a filing system was created by grouping the topics into specific themes according to the frequency of word occurrences, similarities and differences, issues or topics revealed

through the interviews. For example, if the common definition of "smart technology" among the participants was that it improves the operational efficiency, it increases the hotel profitability and it reduces operation costs, then these keywords will be included in the similarity's theme and it can be deduced that the term "smartness" applied to hotel is in general associated with return on investments (ROI) and high service quality.

3.5. Ethical Considerations

Before conducting the research, a business research proposal was sent to the Academic Research and Publications Board (ARPB) within the Institute of Tourism Studies (ITS) for ethical clearance. This process ensured that there were no ethical issues across all the phases of the research process to safeguard the participants, the sponsorship, and the potential readers. As stated by Creswell (2011), it is important to protect the participants, to gain their trust and to promote the integrity of the research project as well as guard against misconduct (suppressing or falsifying the data to meet the researcher or reader's needs) that might impact the reputation of the organizations.

Therefore, when sending the invitations to the respondents, the purpose of the study was clearly explained. Additionally, all invited participants, and where applicable, the companies, were presented with a consent form to protect their rights (please refer to Appendix 4). The form included a brief personal and professional introduction of the researcher, the sponsoring Institute, the purpose of the study and its potential impact on the hospitality industry. The form also assured anonymity to the participants as well as outlining that the data would only be utilized for the purpose of the study. To protect the anonymity of the participants and their respective companies, a system of codes was used in the findings analysis (as shown in Table 2).
The interviews were carried out at the time and setting agreed with the interviewees. The duration of the interview was between 45 minutes to a maximum of one hour and 30 minutes, and all interviewees were advised and given the questions before the meeting.

3.6. Conclusion

The use of surveys and interviews in the qualitative methodology research proved useful to better understand the research questions from different perspectives and contexts than it could be done using only surveys or interviews. It required the researcher to think deep and analyse the results rigorously and see whether there was a difference in the replies amongst all stakeholders and respondents. Therefore, both data collection tools could be used synergically to compare the data, and the researcher could dig into the research questions to extrapolate better insights. However, this method presented some limitations too; firstly, it required more work and time to prepare the surveys and the interview questions. Secondly, it required the researcher to develop a broader set of skills to sift through the data extrapolated from both tools. Nevertheless, the difficulties found along the way helped motivate the researcher even more. The following chapter will analyse in detail the data obtained from the research and will discuss the findings.

Chapter Four: Research Findings

4.1. Introduction

In this chapter, the findings of the study are presented showing how the combination of vertical and horizontal data collection models allowed to obtain and analyse a rich and multi-level data set.

The findings will be organized as follows: first, the survey sections (demographics, hotels and smart technology, efficiency and productivity, Human Resources and Smart Hotels and sustainability) are analysed individually. Afterwards, the same analysis will be carried out for the interviews respectively with Senior Hotel Managers, IT suppliers, the Malta Tourism Authority (MTA) and the Ministry of Tourism (MOT) representatives. Data and charts will be presented as supporting evidence.

4.2. Research Results

To present the dataset in a more manageable and effective way, the results are presented per section and individually, starting from Survey 1 (The Smart Hotel - survey addressed to the hospitality industry professionals) and followed by Survey 2 (The Smart Hotel - survey addressed to the general public working within the tourism sector). Afterwards and similarly, the findings of the interviews are presented separately, starting from the Senior Managers, and ending with the IT companies and the public entities.

4.2.1. Analysis Survey 1

The first section analysed is the 'Demographics' and it refers to their gender, age, occupational and educational level.

a. Demographics

47.5% of the participants were female and 50.8% were male; with 39.3% of the participants having a Bachelor's degree, 28% having a Doctorate or a Master while the rest have graduated from college. Most of the respondents have a middle management job and the mean job experience for most of the participants (55.7%) is over six years. The average age of most respondents is between 30 and 39 years of age.

b. Hotels and Smart Technology

Figure 7 summarizes the respondents' knowledge about Smart Hotels Indicators. In this section, the answers were on a scale from one to five, with 1 = Strongly disagree, 2 = Disagree, 3= Neutral, 4= Agree, 5 = Strongly Agree. Slightly more than half (49%) of the respondents appear to have an idea of what are the indicators of a "Smart Hotel" and yet 54% of them did not stay or work in them as opposed to the remaining 43% who did. More than half of the respondents (68%) replied that they agree or strongly agree that technology is a major driver for change within the hospitality industry (Figure 8). The majority of the respondents (79%) perceive AI in their job as a strength while 17% perceive it as a weakness. To the question whether Malta is an ideal country for nurturing digital innovations, smart technologies, and artificial intelligence (AI), 75% agreed while 22% did not agree. Figures 9 and 10 below show the strengths and weaknesses of A.I. according to the respondents.

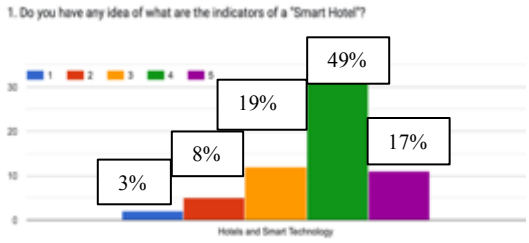

Figure 7. *Smart Hotel Indicators*

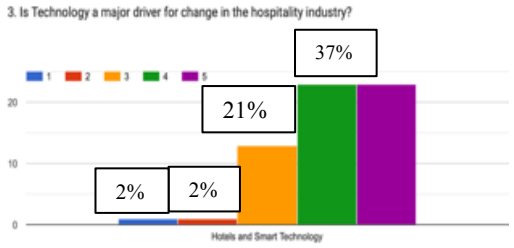

Figure 8. *Technology as change catalyst*

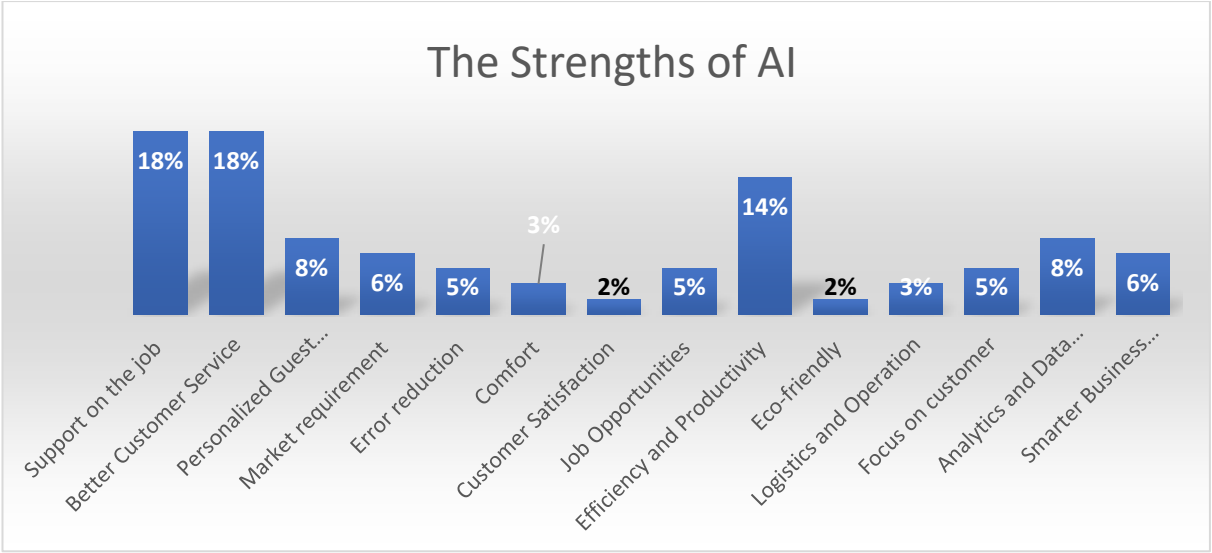

Figure 9. *The Strengths of AI*

Figure 9 explains the perceived strengths of AI: 18% mentioned that AI supports their job by helping them finalizing tasks quicker and by automating tasks; 18% said it improves customer service; 14% mentioned efficiency and productivity; 8% said that it is a great tool for analytics and data management; 8% said that it contributes to personalize the guest experience; 6% outlined that AI has become a market requirement and that it helps in making smarter business decisions; for 5% AI leads to error reduction, creates more job opportunities (5%), customers focus (5%), comfort (3%), customer satisfaction (2%) and eco-friendliness (2%).

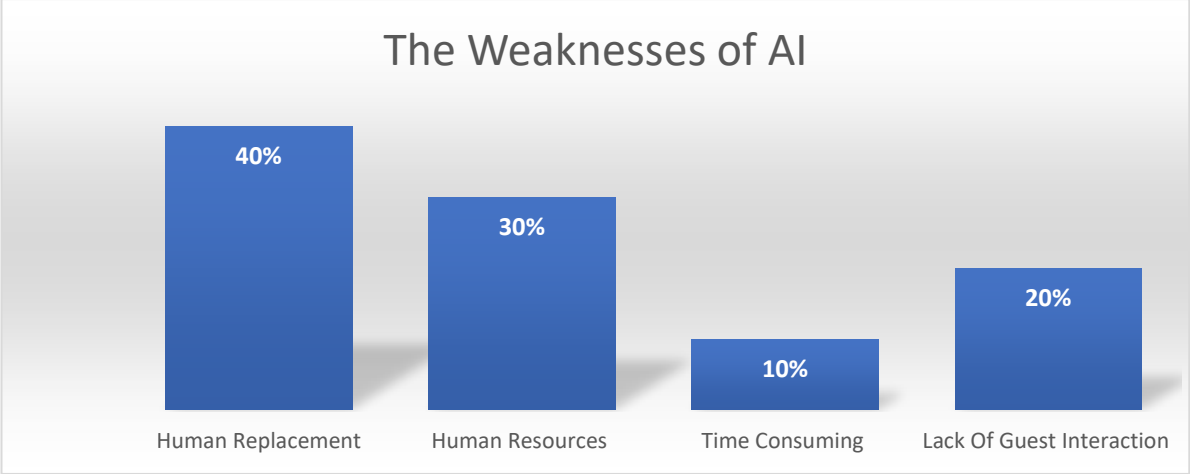

Figure 10. *The Weaknesses of AI*

Figure 10 shows the perceived weaknesses of AI: for 40% it will lead to human replacement; for 30% AI is not equivalent to human skills; for 20% leads to lack of guest interaction and for 10% is time consuming for training, updating and debugging.

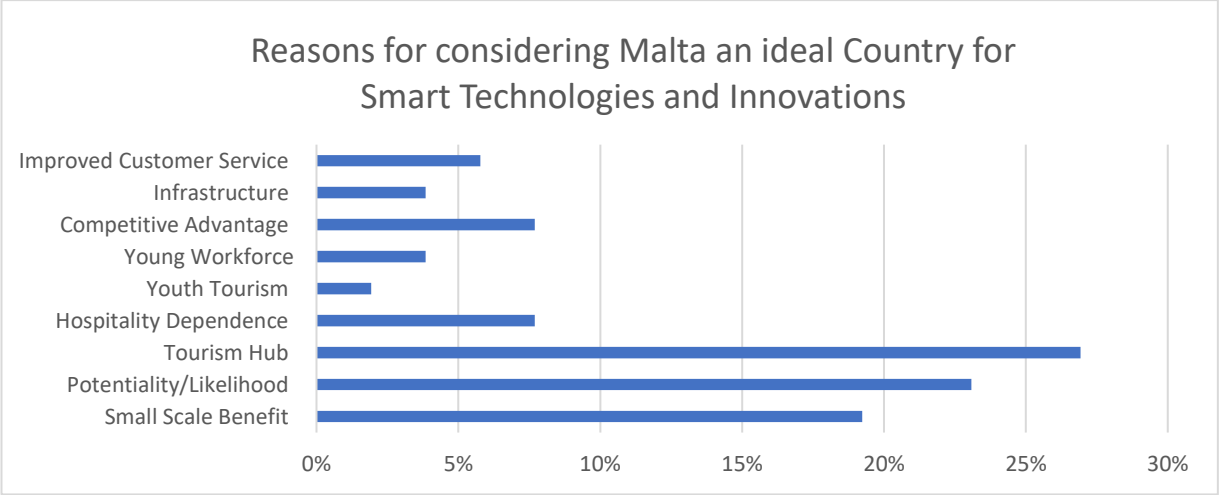

Figure 11. *Reasons why Malta is an ideal Country for Smart Technologies and Innovations*

Figure 11 shows the respondents' motivators for considering Malta an ideal country to nurture smart technologies and innovations. The category of Malta as a Tourism Hub with tourists all year round and from all over the world was for 27% of respondents, a recurring mention. In 23% of the responses, Malta can potentially be an ideal country to nurture smart technologies and innovations. Several participants (19%) replied that the small scale of the Island may benefit and facilitate the implementation of a culture for innovations. Malta's hospitality dependence is a category that appeared in 8% of the responses with an equal 8% of responses that include the competitive advantage as a motivator. Around 6% of the respondents mentioned that smart technologies will improve the customer service and therefore increase the likelihood of Malta being an ideal country for investing into innovation. The young workforce within the hospitality industry was also considered a motivator for 4% of the respondents, and youth tourism (2%), the increasing improvement in hospitality infrastructures (4%) and architecture are also evaluated as reasons for innovative growth in Malta.

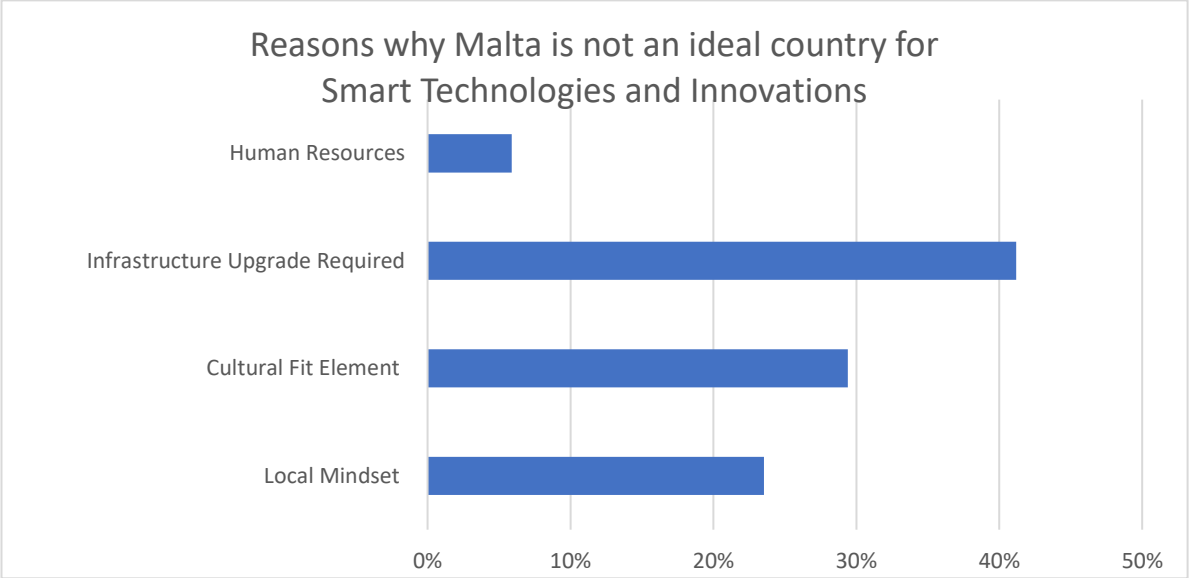

Figure 12. *Reasons why Malta is not an ideal country for smart technologies and innovations*

Figure 12 represents the reasons that prevent Malta to be an ideal country for smart technologies and innovations implementation. Firstly, the necessity of upgrading the infrastructures was mentioned in 41% of the cases, followed by a 29% of responses that believe that there exists a cultural fit element which may put a stop to Malta in pursuing IT innovations; 24% of responses include the local mindset as another

restricting motivator; and another 6% relating the improbability of Malta being an ideal country for nurturing smart technologies due to a human resources matter.

c. Efficiency and Productivity

In this section, the respondents were asked to provide their opinion on 'how' and 'whether' the smart technology impacts the hotel's efficiency and productivity. The answers provided for a Likert Scale from one to five with 1 = Strongly disagree, 2 = Disagree, 3= Neutral, 4= Agree, 5 = Strongly Agree, to establish the level of agreement or disagreement with the following statements:

- 51% of the respondents strongly agree that smart technology helps hotels in terms of efficiency and productivity.
- 54% of the respondents strongly agree that smart technology and the IoT (e-kiosks, keyless entry, contactless payment, chatbots, mobile check-in) will improve efficiency (self-check-in, skip the queue, less physical touchpoints).
- 49% of the respondents strongly agree that smart cameras with facial-recognition capabilities will reduce waiting time and help in recognizing repeat guests.

83% of respondents are aware of what is called the Customer Relationship Management System (CRMS) and also that it is a tool that enables targeted upselling by pulling guest preferences data and contributing to personalize the guest experience.

d. Human Resources

This section is relative to the employees' turnover intentions and the human resources aspect. The respondents were asked to provide their opinion on 'how' and 'whether' smart technology impacts the employee's efficiency and productivity.

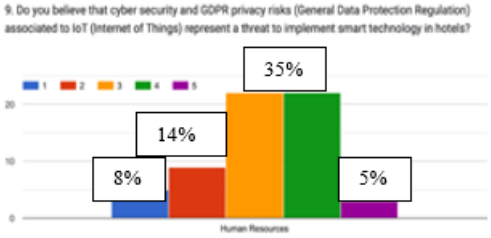

Figure 13. *GDPR*

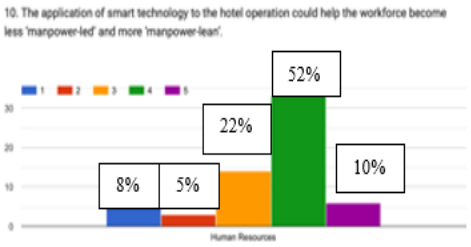

Figure 14. *Workforce*

Figure 13 shows that 35% respondents agree and 5% strongly agree that cyber security and GDPR privacy risks (General Data Protection Regulation) associated to IoT (Internet of Things) represent a threat to implement smart technology in hotels and an equal 35% remained neutral; with only 14% of the respondents saying that they disagree and 8% strongly disagreeing with this statement.

Most of the respondents agree (52%) that the application of smart technologies to the hotel operation could lead to being more 'manpower-lean' as opposed to 'manpower-led'. Only 13% (in total) disagreed or strongly disagreed with this statement (as shown in Figure 14).

When asked whether they perceive AI as a threat or an opportunity for their job, the outcome is that it is decisively an opportunity with 79% responses as opposed to the 17% responses that see AI as a threat.

Figure 15 illustrates the reasons for their replies showing 72,1% believing that AI will lead to increased quality of products and services as well as errorless processes; and with 54,1 on the contrary % believing that the human connection cannot be replaced by AI in the hospitality industry. Moreover, a third of the respondents (31,1%) believe that there are challenges relative to the technology access and usage; and additionally, a significant 23% believe that AI may replace the human workforce; with a minimal part of the respondents (11,5%) saying that the manpower lean business model is not suitable for the hospitality industry.

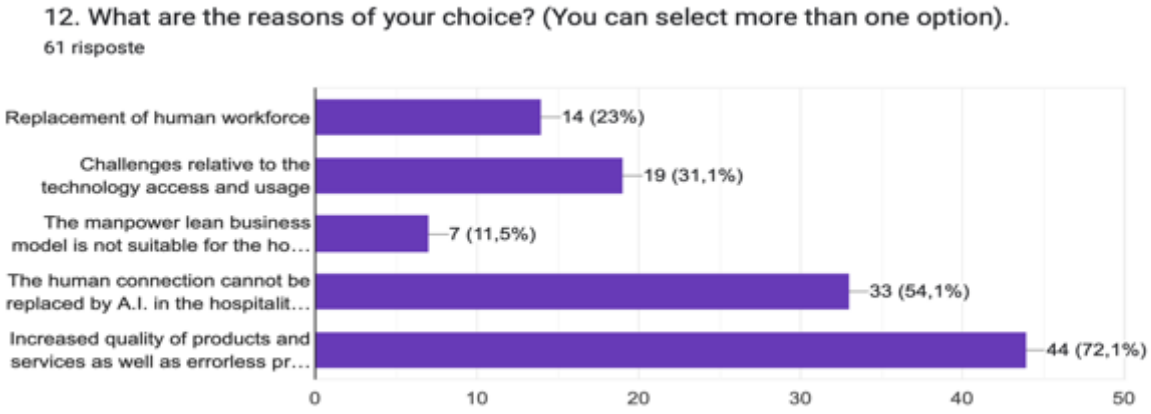

***Figure 15**. AI Opportunity or Threat – Reasons*

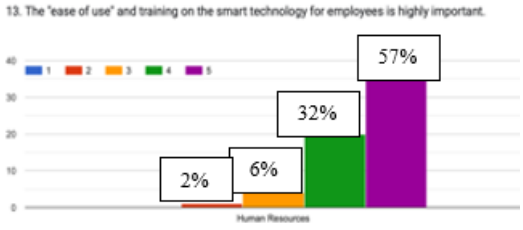

***Figure 16**. "Ease of use" and Training*

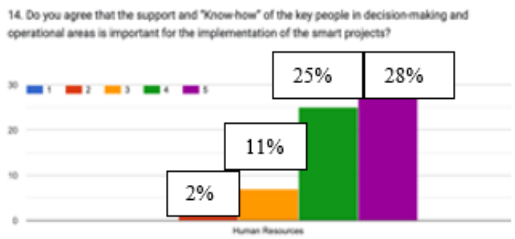

***Figure 17**. Support of decision-makers*

Most of the respondents (89%) (Figure 16) agree or strongly agree that the "ease of use" and training on the smart technology is highly important; with the question whether the support and "know-how" of decision-makers and operational areas is important for the implementation of smart projects finding the consensus of most of the respondents (overall 53% in Figure 17) who agree or strongly disagree with the statement.

When the respondents were asked whether technology can raise productivity if applied to Housekeeping and Front Desk departments, the findings show that 86% responses say yes whereas only 10% say not. Figure 18 lists the reasons for their replies.

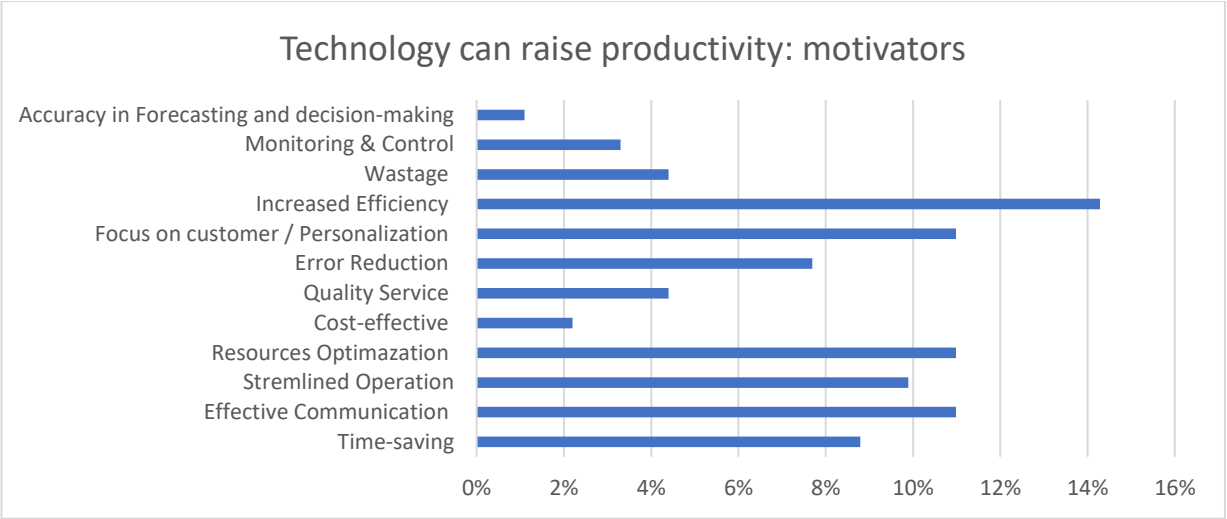

***Figure 18**. Technology can raise productivity: motivators*

14% argue that technology is a vehicle of increased efficiency; 11% think that it helps to focus more on the customer and therefore leads to a more personalized experience; 11% say that technology allows to prioritize tasks and optimize manpower skills; 11% say that it can make the communication faster and more effective; 10% believe technology helps to streamline the operation; 9% highlight the time-saving benefit; 8% recognized that technology allows error reduction; and other respondents in smaller percentages evaluated positively the technology cost-effectiveness (2%); the quality of service (4%); more monitoring and control (3%); less wastage (4%) and one person mentioned more accuracy in forecasting and decision-making (1%) (as shown in Figure 18).

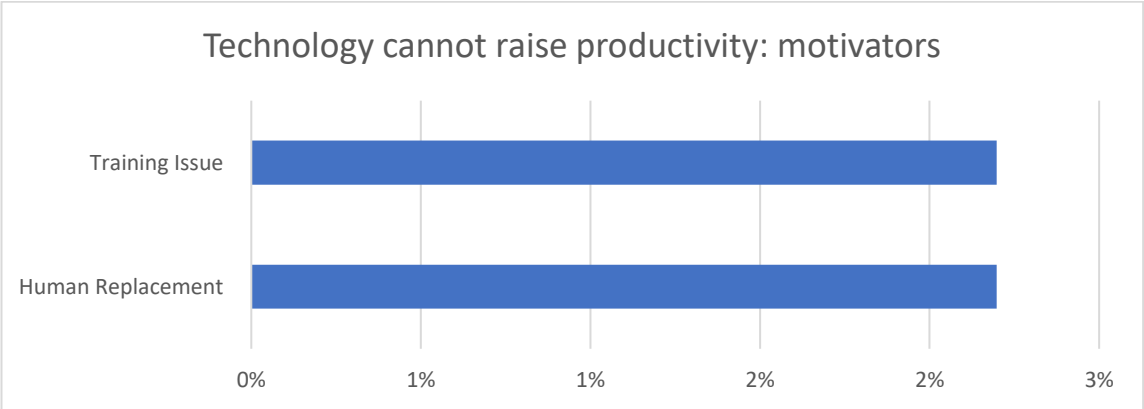

***Figure 19**. Technology cannot raise productivity: motivators*

In turn, 2% said that the human aspect is crucial for the hospitality sector and therefore technology cannot replace humans; an equal 2% mentioned training issues related to the law 'tech-literate' staff and high turnover (as shown in Figure 19).

e. Smart Hotels and Sustainability

In this section, the respondents were asked their opinion about the potential of the Smart Hotel business model to drive sustainability. Most of the respondents agree or strongly agree (respectively 41% and 43%) that technology can be a driving force for hotels to become more sustainable.

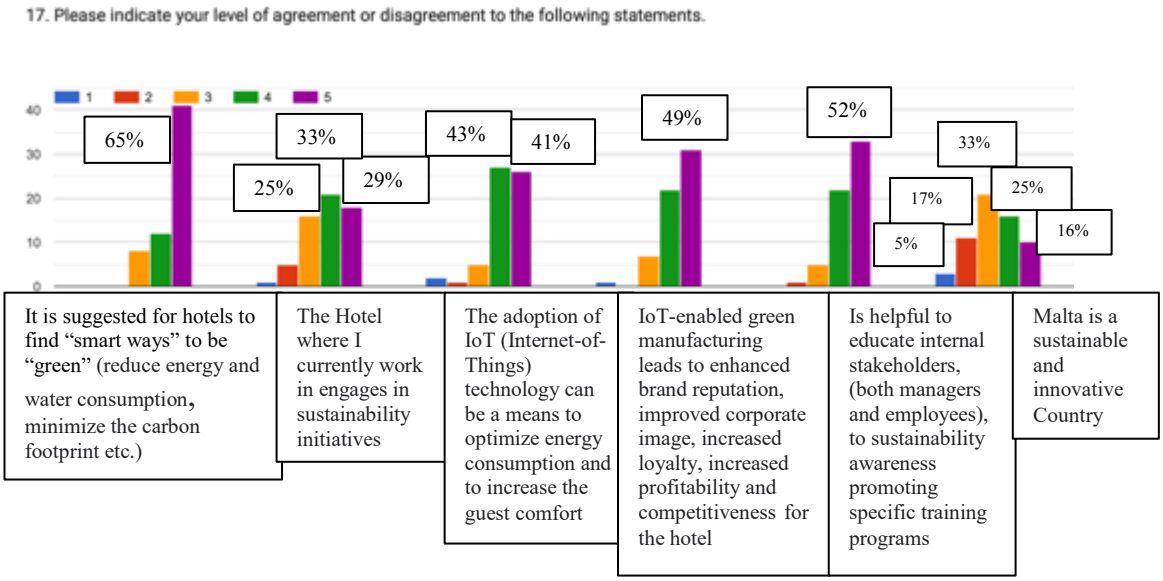

Figure 20. *Smart Hotels and sustainability*

65% of respondents strongly agree that hotels should encourage "smart ways" to be "green" (reduce energy and water consumption, minimize the carbon footprint etc.). For the statement "The Hotel where I currently work engages in sustainability initiatives", 29% were found to strongly agree; 33% agree and 25% stayed neutral; with an overall of 84% of respondents agreeing or strongly agreeing (respectively 43% and 41%) that the adoption of the IoT technology can be a means to optimize energy consumption and increase the guest comfort. Another 49% of the respondents strongly agree that IoT-enabled green manufacturing leads to enhanced brand reputation, improved corporate image, increased loyalty, increased profitability, and competitiveness for the hotel. Moreover, even on the statement that it is helpful to

educate internal stakeholders (both managers and employees), to sustainability awareness promoting specific training programs, 52% of respondents said that they strongly agree. The outcome of the statement relative to whether Malta is a sustainable and innovative country, is mixed with 5% of respondents that strongly disagree; 17% disagree; 25% agree; 16% strongly agree and 33% replied neutral.

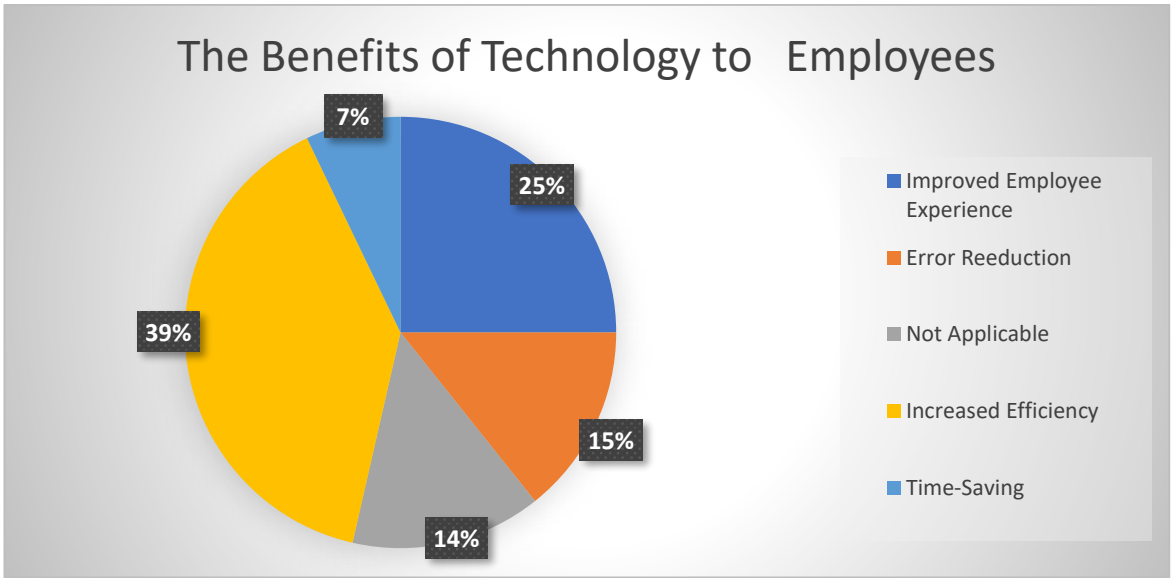

Figure 21. *The Benefits of Technology to Employees*

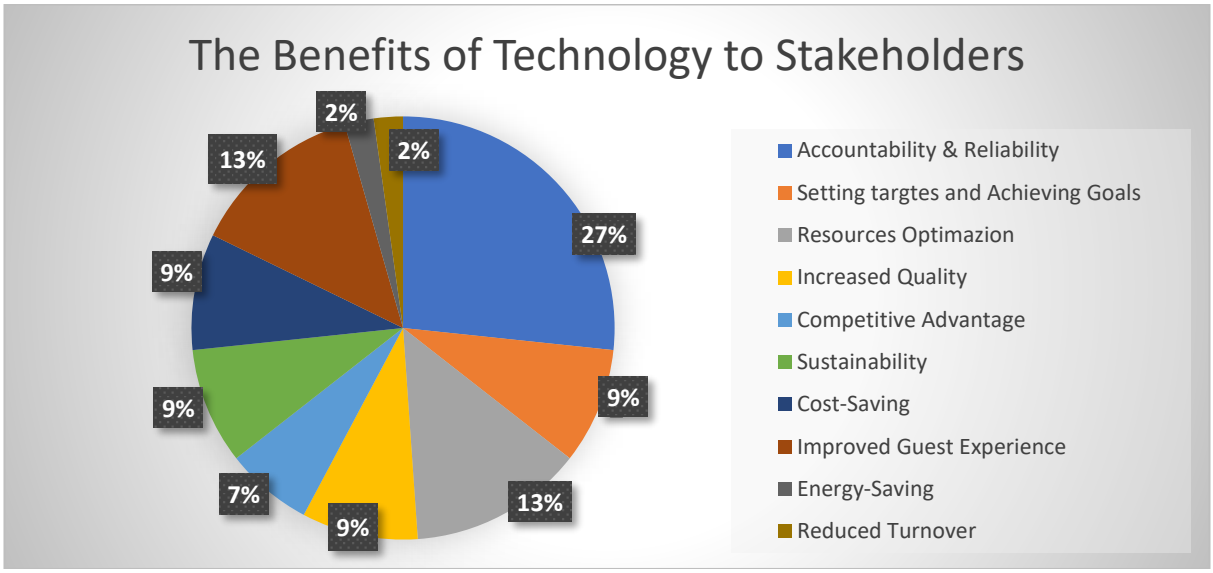

Figure 22. *The Benefits of Technology to Stakeholders*

The percentages in figure 21 indicate the number of times a certain theme was mentioned. For example, the increased efficiency appeared in 39% of respondents' comments; improved employee experience appeared in 25% of the cases; error

reduction was also one of the benefits outlined in 15% of the responses; timesaving was mentioned in 7% of the responses; and 14% of the comments are not applicable or pertinent.

Figure 22 shows the most frequently reported advantages of the technology being seen by the respondents to being beneficial to the stakeholders. These are accountability and reliability (27%); resources' optimization (13%); improved guest experience (13%); increased quality (9%); competitive advantage (7%); sustainability (9%); cost-saving (9%); setting targets and achieving goals (9%); energy-saving (2%) and reduced turnover (2%).

The statement in question 19 refers to the consumption of tourism in the period post COVID-19. The respondents are asked to what extent they agree that it is important to have a lean framework to achieve sustainable competitive advantage. Most of the respondents agree or strongly agree (respectively 37% and 38%) with the statement, whereas 16% remained neutral and 6% being in disagreement. Most of the respondents (72,1%) say that it is important to be innovative in the hospitality industry.

4.2.2. Analysis Survey 2

a. Demographics

Men represent 56.1% of the respondents and women represent the remaining 43.9%; with 51.2% of the participants having an average age between 30 and 39 years. Moreover, the majority of the respondents (46.3%) have a Bachelor's degree, 22% have completed college, 17.1% have completed trade school and 14.6% have a Doctorate or Master's degree. Regarding the occupational level, 29.3% hold a Senior Management role; 24.4% of the respondents occupy a Middle Management position or are skilled workers; and 22% are junior workers.

b. Hotels and Smart Technology

In this section, the findings pertaining to hotels and smart technology' are presented. The respondents were asked to define the Smart Hotel category and their opinion on 'how' and 'whether' the smart technology impacts the hotel's profitability. The

answers are on a scale from one to five, with 1 = Strongly disagree, 2 = Disagree, 3= Neutral, 4= Agree, 5 = Strongly Agree.

Hotels are the preferred accommodation type for a holiday for 68,3% of the respondents. However, 19,5% of the participants chose a furnished apartment as an accommodation option and only 7,3% of the respondents opted for a guest house; with the remaining 4,9% preferring to stay in a hostel during their vacation. When choosing the hotel rating, the majority of the respondents (51,2%) selected 4-star hotels; whereas 29,3% chose the 5-star hotels, 4,9% opted for 3-star hotels and 14,6% selected 'other' type of accommodation. To the question whether they stayed in or heard about a Smart Hotel, a significant 56,1% replied that they never stayed in a Smart Hotel whereas 39% did. On the other hand, 4,9% of the respondents admitted that they are not sure of what classifies hotel as a a Smart Hotel and replied 'other'. When asked whether they know what Smart Hotel Indicators are; the neutral response option had the highest number of selections (34%); whilst the remaining respondents agreed or disagreed nearly in equal parts with the statement.

Figure 23. *Importance of Innovation in Hotels*

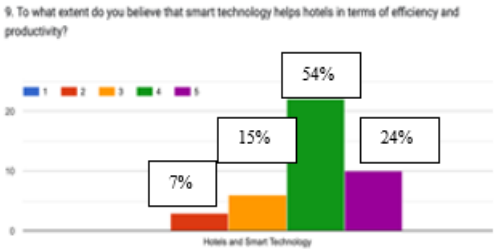

Figure 24. *Efficiency and Productivity*

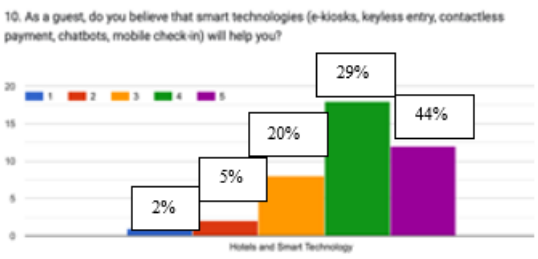

Figure 25. *Helpfulness of Smart Technologies*

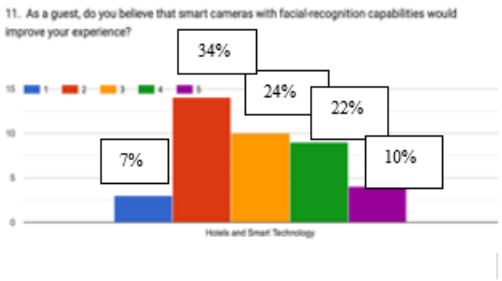

Figure 26. *Facial Recognition*

Questions eight to 22 list some features of the Smart Technologies and the degree to which they agree or disagree with a statement or the likelihood that these would help according to the respondents.

For 73,2% of the respondents highlighted that being innovative in the hospitality industry is very important (Figure 23). Out of 41 responses, 78% (54% likely and 24% most likely) replied that smart technologies will likely help in terms of efficiency and productivity (Figure 24). Most respondents also agreed (73%), in slightly different degrees, that e-kiosks, keyless entry, mobile check-in etc. are helpful features for the guests (Figure 25). With regards to smart cameras enabling facial-recognition, 34% of the responses show that it is unlikely that this would improve the guest experience and 32% (10% of which very likely) believe that smart-cameras would enhance a guest stay (Figure 26).

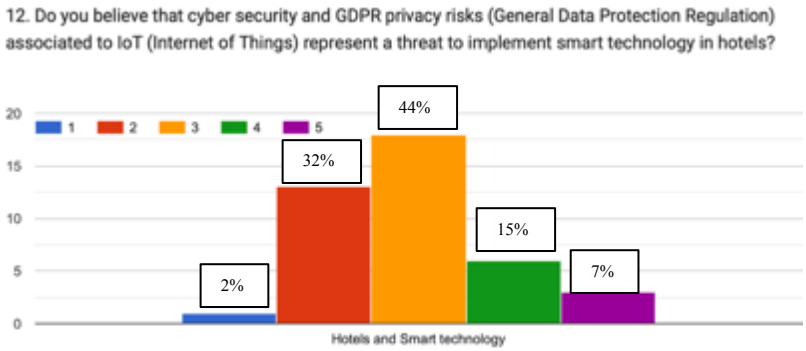

***Figure 27**. Cyber Security and GDPR privacy risks as threat*

When asked whether cyber security and GDPR privacy risks constitute a threat for the implementation of smart technology, 44% were neutral, 32% said it was unlikely and 2% very unlikely (Figure 27).

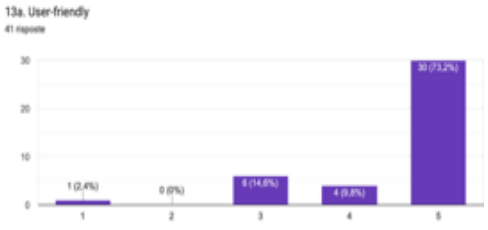

***Figure 28**. User-friendliness*

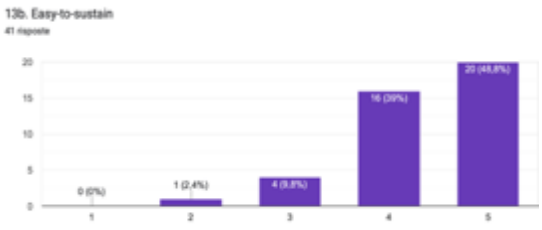

***Figure 29**. Easy to sustain*

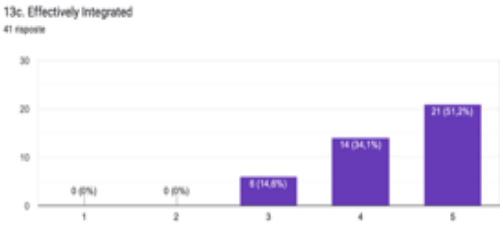

***Figure 30**. Effectively Integrated*

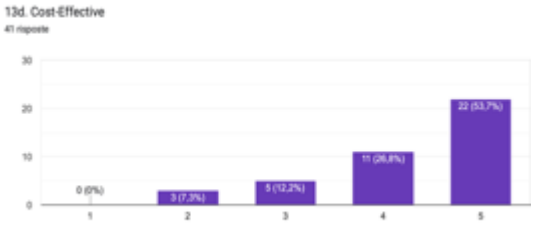

***Figure 31**. Cost effective*

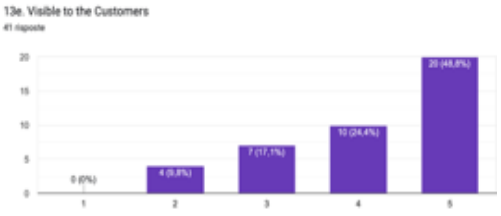

***Figure 32**. Visible to the Customers*

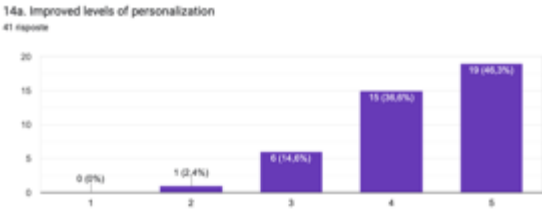

***Figure 33**. Level of Personalization*

***Figure 34**. Accessibility to Information*

***Figure 35**. Operational Efficiency*

Figure 28 shows that the majority of respondents (73,2%) value the user-friendliness of the technology, followed by its cost-effectiveness (53,7% - Figure 31), how effectively it integrates with other systems (51,2% - Figure 30), and they consider its visibility to the customers as well as how easy it is to sustain it (48,8% respectively – Figures 29 and 32), equally important.

According to the responses, the features of smart technologies which are most valued for stakeholders and guests are the easier access to information (71,8% - Figure 34), the operational efficiency (65,9% - Figure 35) and the improved level of personalization that come with such technologies (46,3% - Figure 33).

To the question whether technology benefits both guests and employees, the responses' are varied. Most of the respondents (41%) say that very likely the technology benefits are shared between guests and technology; 29% of the respondents

replied neutral and 7% stated that it is unlikely that the technology applied to hotels is beneficial to both guests and employees.

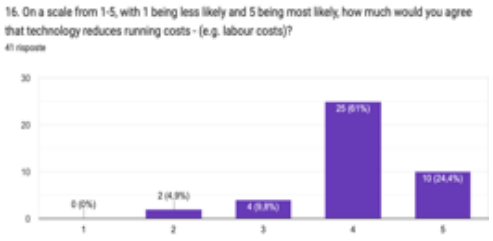

Figure 36. *Running Costs Reduction*

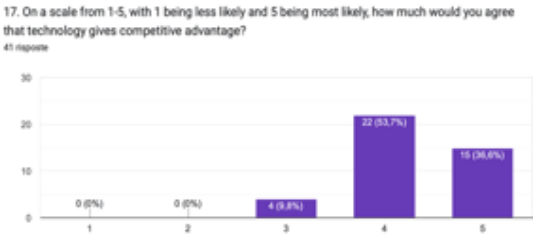

Figure 37. *Competitive Advantage*

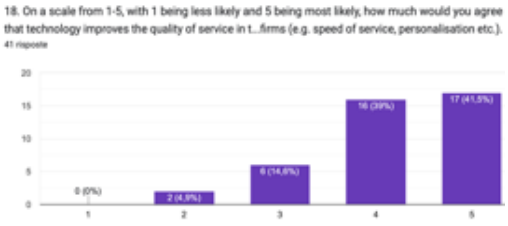

Figure 38. *Quality of Service*

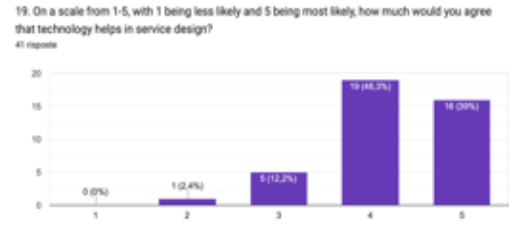

Figure 39. *Service Design*

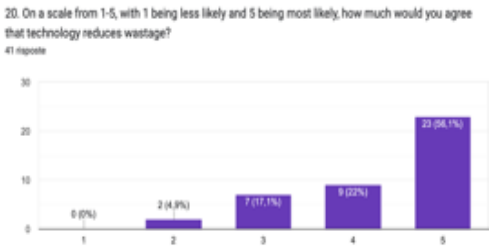

Figure 40. *Wastage Reduction*

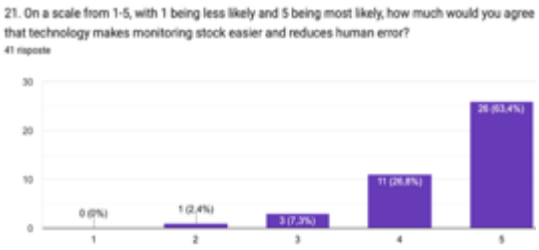

Figure 41. *Human Error Reduction*

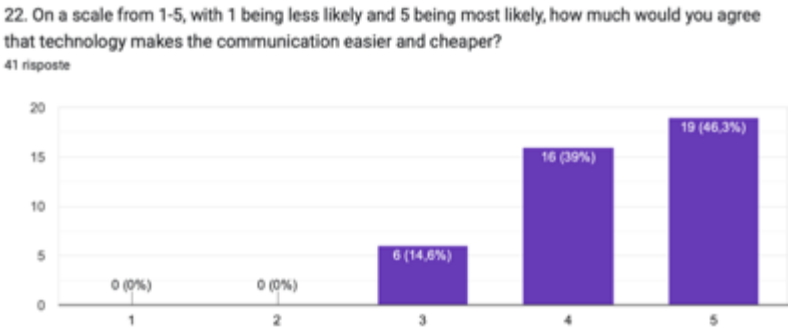

Figure 42. *Improved Communication*

25 responses (61% - Figure 36) say that technology will help reduce running costs such as the labour costs etc.; 22 responses (53,7% - Figure 37) agree that it gives competitive advantage; 17 respondents (41,5% - Figure 38) believe that technology will likely improve the quality of service; 19 responses (46,3% - Figure 39) agree that technology can improve the service design and 46,3% (Figure 42) state that it can make communication easier and cheaper. Most of the responses (63,4% - Figure 41) agree that smart technology would most likely help in monitoring stocking levels and reducing human error; with 23 responses (56,1% - Figure 40) saying that technology will likely be beneficial in reducing wastage.

c. Smart Hotels and Sustainability

Most of the responses (39%) generally agree that technology can be a driving force for a hotel to become more sustainable. To the statement that hotels should encourage "smart ways" to be "green", 46% of the respondents strongly agreed; 27% agreed; 24% remained neutral and only 2% disagreed. Besides the overall positive assessment about Smart Hotels and sustainability, 49% of the respondents disagreed and strongly disagreed (32% and 17% respectively) with the statement that Malta is a sustainable and innovative country; whereas 41% replied neutral and the remaining respondents (only 4%) agreed.

4.2.3. Interviews' Analysis

a. Hotel Senior Managers

Company General Information – Section 1

SM1 talks about Holding X (pseudonym), a 5-star Hotel. Holding X is part of a Hotel Chain. The Hotel has 150 rooms and hosts a Spa which comprises an indoor pool, a gymnasium, a sauna, an ice room and three treatment rooms. A heated pool on the rooftop compliments the wellness area. A total of three outlets operate breakfast, lunch, and dinner. Most of the clientele comes from the corporate segment with an average age between 35 and 45 years old; 20% of the clientele comes from the Hotel

Loyalty Scheme; whilst 40% from Online Travel Agencies (OTAs). The workforce is nearly made up of entirely full-time basis employees.

SM1 states that what differentiates Holding X from the other hotels in the area is the service which reflects in top scores on online reviews. For example, their hybrid breakfast, partly buffet and partly a la Carte, focuses on a "Boutique style" service, whilst still being part of a big brand. To the question on how the hotel overcome the hurdles caused by the COVID-19 pandemic, SM1 replied that putting aside the unfavourable economic time, the hotel had substantial financial help from the Group and, even for the pre-opening, they could employ a full team. SM1 explains that Holding X, being a brand-new hotel, is fine tuning a long-term commercial strategy intended to drive more corporate business and deploy the benefits inherited as part of a franchise Company.

SM2 leads two hotels, Holding B (4-star) and Holding C (3-star) (pseudonyms), in a very modern and popular tourist hotspot in Malta. Holding B consists of 160 rooms and Holding C of 40 rooms. Both hotels share the facilities. These consist of an infinity pool on the rooftop complemented by two hot tubs, a seasonal restaurant, a high class "club-feel" venue, a whiskey Lounge, two breakfast restaurants, one in each hotel, and an upscale Bistro. Additionally, Holding B includes meeting facilities and a brand-new Spa comprising an indoor pool, hammam, sauna, steam room and treatment rooms. The workforce average age is between 30 and 35 years old.

SM2 says that because of their distinctive décor, they pride themselves in offering exclusive experiences to their clients who remember the hotel for their uniqueness.

With regards to the long-term strategy, SM2 states that the plan is to elevate Holding B to a 5-star and persuade the business strategy of a "one-stop-shop" experience, that offers an extended variety of services from one single location. This idea is supported by the creation of a web app to make it more convenient and seamless for the customers.

The interview with SM3 refers to a 5-star Hotel, which will be referred to as Holding E (pseudonym). Holding E counts 439 rooms and is an independent hotel; it is not a Chain Hotel but forms part of the Preferred Group (International Group of the finest and diverse independent hotels portfolio). SM3 states that what distinguishes the hotel is the fact that they have 5-star standards without actually forming part of a Chain. SM3 adds that the location is the hotel's main asset as it is at the doorstep of one of Malta's most popular cities. Additionally, what differentiates Holding E is its size, as

opposed to other accommodation suppliers in the area which are smaller. Holding E caters for corporate and leisure clients, groups and conferences. According to SM3, the hotel tends to attract older client generations who are more interested in cultural activities (museums, churches, restaurants). The British market is the main client market. Holding E boasts a varied workforce from different Countries. SM3 says that during Covid, the hotel simply enforced the regulations imposed by the government. The interviewee did not elaborate on the question relative to the corporate strategy.

The interview with SM4 refers to Holding L, a luxury Holding in the Middle East established in 2014 with the aim of becoming a Leading Holding Company in the hospitality sector. Holding L operates a diverse portfolio of four hotels and resorts, logistics, restaurants, and leisure assets. The long-term business strategy envisages the emergence of their location in the Middle East as an international touristic destination and sustainable development by identifying pretentious investments that increase earnings and bring added value. SM4 remained vague about Question 3.

SM5 and SM6 work for Company Z, which consists of Holding D and Holding P (pseudonyms). Holding D is situated in a popular sought-after area in Malta whereas Holding P is located in the Capital City. Holding D was rebuilt 4 years ago and is today a 4-star Hotel consisting of 170 rooms, a luxury Spa, an on-site fine dining restaurant, a roof terrace and an outdoor Beach Club. Holding P is a self-catered luxury Boutique Hotel consisting of seven stylish suites. SM5 and SM6 agree that what differentiates Holding D and P is their sustainable efforts and the extra care that they take to enhance the customer experience. SM5 and SM6 say that during the pandemic, they continued building strategies to overcome the situation. Their business strategy is to increase the value and the facilities of both properties as well as adopting more sustainability values.

Smart Hotel – Section 2

The common definition of Smart Hotel amongst all six interviewees within the Hospitality Industry is one which is highly dependent on automation and tools such as AI and the IoT. From an operational perspective, it would help to optimize the time the employees, and improve the guest experience, whilst from a commercial perspective, it would increase the hotel's revenue. Most of the interviewees agreed

that, to a certain extent, smart hotels can increase the service quality level if there is a balance between smartness and human interaction.

With regards to the level of smartness, half of the hotel interviewees outlined that the hotels where they are currently working at are partially "smart". Holding X, Holdings B and C, and Holding L have a certain level of automated systems which allow them to adjust the room ambience through lighting, temperature, and smart access to the room. SM3 said that Holding E is decidedly far from being or becoming a smart hotel. SM5 and SM6 assertively agree that their hotels (Holding D and P) can qualify as "Smart Hotels" because the initiatives carried out follow the latest innovations within the hospitality industry. Nonetheless, SM5 admits that the tech market is continuously developing and that is the downside of being a smart hotel.

When the interviewer asked about the Smart Hotel Indicators, two interviewees (SM1 and SM4) replied increased efficiency and productivity, while the others mentioned automation, digitalization, personalization, speed, flexibility and sustainability.

Half of the interviewees (SM1, SM5 and SM6) believed that the introduction of a Smart Hotel to the hospitality business would add innovation, accessibility to data and analytics to track labour costs and stock, and therefore it helps to plan better, to source out new providers or open new markets in Malta. SM3 admitted being against technology even though it enhances the guest experience.

When it comes to future plans and smart applications, all interviewees with the exception of one, have plans of improving Smart Technologies applications to enhance the guests' stay experience. For example, one of the interviewees mentioned that Company L has invested over 10 million dirhams in energy saving projects as they believe that these will guarantee energy and cost savings in the future. SM4 and SM5 also stated that Company Z is working on a very big project to deliver a "360 degrees guest experience journey".

Furthermore, most of the hotel interviewees, use smart applications such as eco-friendly A/C and lighting system which can be controlled by the BMS, used Chromecast for smart TVs, a contactless system to open the doors through a mobile App, and implemented chatbots on the website, as well as motorized curtains and a digital screen in the Lobby. SM4 stated that at Holding L they have a backend system that allows them to control the Guest Room Management System (GRMS) from the Property Management System (PMS).

Two of the interviewees (SM5 and SM6) stated that they have online check-in solutions; door code entry; suite pads; digital registration forms; and a CRM to administer guest interaction and for data analysis. Moreover, they also mentioned a Room Energy Management System (REMS) and promotional material that is available through near field communication (NFC) cards and Digital Frames.

All interviewees were familiar with the benefits of smart technology with exception of SM1 who disagrees that it can improve the payroll cost and SM3 who stated that smart technology eliminates human interaction.

When evaluating an IT investment, SM1 distinguished between chain hotels and independent hotels. Chain hotels use set systems imposed by the brand, whereas smaller independent hotels can choose what they want, hence it is more advantageous. SM2 stated that for a decision-making process, they first establish whether the investment is really needed, then decisions are discussed at senior management level, and afterwards with the stakeholders and Heads of Departments (HODs) to see the operational side of the implementation. SM4 stated that Holding L provides asset management, advisory services and is committed to create value for the clients. SM3 stated that owners and investors expect payroll costs to be reduced, however, this is very unlikely to happen unless the employees are completely replaced. SM5 claimed that in the hotels they work for, the focus is entirely on the guest experience and creating value rather than on profit. They add that they are exploring every possible way to advance their technology. SM6 stated that the directors and senior management allow the employees at all levels, to be involved in decision-processes and when brainstorming ideas. All employees are young, tech-savvy, well-trained and open-minded and this gives them a unique advantage compared to other hotels. SM5 stated that their company believes in outsourcing sector experts to assist them, as decisions based on the sole knowledge of owners and stakeholders is reductive.

All interviewees agreed that smart technology is expensive and hotel management finds it difficult to justify the expenditure without having a ROI estimation and duration; the longer the ROI, the less likely that owners will invest.

Most of the hotel interviewees agreed that AI is beneficial in the daily operation. AI is perceived positively mainly when associated with for example, chatbots and virtual voice assistance to reply to frequently asked questions or for dinner reservations; for monotonous tasks such as data collection; for marketing and distribution channels to extend the distribution network and maximize the yield, increasing demand,

occupancy, and rates. All interviewees agree that AI does not affect the employee's turnover except for one (SM1) who claimed that AI systems make employees lazier and less productive as many operation processes can be automated.

The barriers for the implementation of smart technology are the protocols that Chain Hotels are obliged to follow (SM1); the duration of ROI (SM4); and the mindset (SM6).

The statement about whether cyber security and GDPR privacy risks associated to smart technology represent a real barrier to its implementation seems unfounded. All hotel interviewees agreed that hotels have always stored a tremendous amount of data, both for guests and employees, but nowadays there are new measures in place to protect the individuals' rights. An example SM4 mentioned is the stringent policies in the network connection (SM4) and another is the one SM5 mentioned in relation to identifying reliable partners.

Smart Hotels and Sustainability – Section 3

With regards to the IoT, most of the hotel interviewees replied that they do not feature this type of technology in their hotels. Half of them are aware of the benefits of IoT technology stating that it drives efficiency and productivity through energy wastage control and smart usage of the resources (SM4); and that the IoT could be a driving force towards sustainability thanks to IT interoperation (SM5 and SM6).

As in how technology helps in achieving competitive sustainable goals, SM1 stated that smart technology helps evaluate processes and automate systems. Self-irrigating systems, and programmed lighting systems are sustainable initiatives that contribute in small scale to reach the goals. SM2 instead stated that digitalization and paperless policies contribute to achieve sustainable goals. SM4 suggested a differentiated product. SM5 and SM6 stated that data analytics reduces wastage and smart technologies, such as timers and sensors, contribute to energy saving practices. SM3 did not reply to this question.

About why hotels should invest more in smartness and sustainability, SM5 stated that they are the new trends, besides having a better overview of the business and forecasts. SM6 stated that it would help Malta, as a remote Island, become more of an independent country. SM1 replies that hotels are trying to become smarter and more sustainable, however, it is suggested that the Maltese Community first improves the

infrastructures. For example, greenery and sustainable mobility solutions are a necessary element for the luxury market but these features are still inexistent in Malta, therefore the hotels are reluctant in doing even more than what is being done already. SM2 also says that a number of hotels in Malta are doing renovations to cater for the installation of smart technology, and this is very promising as it means that owners are more environmentally conscious.

When the interviewer asked to elaborate regarding "Sustainability Readiness" and "IoT Readiness", SM1 replied that Malta cannot afford a luxury market because of the infrastructures. SM2 suggested a separate category for Smart Hotels. SM4recommended the "retro-fit" approach to renovate and upgrade old buildings. SM5 and SM6 agreed that consultant companies can provide guidelines and advice as to where the market is leading and about future proof projects besides helping businesses to adapt to the latest trends thanks to their expertise.

b. IT Companies

Generally, IT Companies tend to agree with the fact that hotels are very cautious when it comes to technology as opposed to other industries, however, they believe that recently there has been an improvement. IT1 stated that this depends largely on the category of the hotel. Chain hotels, for example, are driven by international policies and requirements, therefore they do not have any other choice but to comply with the required processes. IT3 stated that this is because of higher financial constraints and pressure than, for example, the gaming sector. Unlike other industries, the hospitality industry, because of its nature, size, and large scale, allows executives and stakeholders to travel and see what is being done abroad and whether the same can be implemented in Malta.

All interviewees agreed that there is typically low faith towards the value of technology due to limited technical understanding amongst hotel decision makers.

IT1 stated that for hotel stakeholders trail schemes, seminars and more business trips to fairs and international conferences may help raise awareness, especially in independent hotels. Moreover, word-of-mouth and favourable comments on social media from other hotels that have implemented the technology, would also help in overcoming the "guinea pig" feeling. IT1 extended the limited technical understanding

to a larger scale and took Malta as an example because of the very close-minded attitude.

IT2 also agreed with the statement and explained that their company has a consultative approach rather than a selling one. Clients' requirements are addressed by asking questions and by educating and consulting. IT3 stated that it is the IT supplier, as a technology provider, that must give assurance and demonstrate how a certain proposed solution can be of benefit. IT3 explained that their approach and technical language changes according to the client; in the case of hotels, they know that the focus must shift from the specific features to the end-result.

With regards to the issues that delay ICT applications, interviewees from the IT supplier's side admitted that the behavioural attitude can be a major issue that slows down the adoption of ICT application. IT1 in fact, believes that generally there is a lack of knowledge and miseducation about the technology concept.

IT2 mentioned time, cost, and miseducation as three major issues that slow down ICT application in hotels. Similarly, IT3 stated that the intense operation (24/7) is one of the factors that prevents ITC upgrades and another is the cost, as hotels need to evaluate the costs on a larger scale depending on the size of the hotel.

All IT Suppliers agreed that smart technology applications significantly impact the hotel's productivity gaining increased customer satisfaction, enhanced operational efficiency and resource optimization; although they all said that AI cannot be as interactive and emphatic as human beings.

For example, IT1 said that there are switches like Do not Disturb (DND) and Make-up room (MUR), that notify housekeeping if the guest is inside the room or not; systems like the Guest Room Management (GRM which) benefit the guest experience whilst the Room Energy Management System (REMS) benefits mainly the owners.

IT2 and IT3 stated that the employees' skills can be deployed in more productive tasks such as follow-up calls, upselling, guest-facing activities and data processing, to generate value; whilst technology can do reporting, audits, automate repetitive tasks and extract analytics.

In the case of IoT, IT1 stated that there are advantages and disadvantages to it. The advantages are the fact that one can upgrade the current infrastructure, even though it is costly, thanks to the retrofit technique and the data intake. The disadvantage is the fact that it requires a substantial security back-up to minimize cyber security risks.

IT2 and IT3 agree that the challenges linked with IoT are again time, money, and a clear company vision to be leaders in innovation and differentiation rather than followers.

To the question whether Malta is a suitable Country to introduce a Smart Hotel, all IT suppliers are very optimistic. IT3 says that all the conditions for a technology market are present but it has not ignited yet. For example, IT2 stated that EU funds are available, and Malta Enterprise is also supporting the business process engineering and through digitization grants (schemes aimed at supporting SMEs, Small-Medium Enterprises, to restructure and realign their activity and implement quality systems and attain product process certifications).

c. The Malta Tourism Authority and the Ministry of Tourism's Representatives

About Smart Hotel Indicators, P1 replied that currently there are not indicators for digitalization or use of smart technologies in hotels. Should there be indicators, these will indicate the level of technology used within the hotel throughout the guest journey touchpoints. The more technologies are utilized, the higher the hotel ranks in terms of smartness and sustainability. P1 explained that, just as at the Ministry of Tourism the customer journey is regarded more from a destination point of view, the same process applies to hotels; the customer journey within the hotel starts from the moment the tourists book the hotel until when they leave and write a review. P3 replied that a Smart Hotel would be one that provides automation, self-service, and AI technology.

When it comes to Malta as a smart destination, all MTA and MOT representatives agreed that Malta is a smart destination. Initiatives mentioned included the Digital Tourism Platform, the VisitMalta App, the first 3D Virtual Citizen called Marija; and digital tourist information kiosks that are in the process of being introduced. According to P1, Malta is significantly advanced compared to other countries not only in terms of dissemination of information using technologies, but also in decision-making. P1 explained that they are not looking at replacing human resources, but at skilling and upskilling the existing resources to be smarter in the way they are deployed and to make the job more interesting.

To the question whether Malta is ready to have Smart Hotels, all agreed that the infrastructures and the technologies are in place to offer this type of service, however, the biggest challenge is the lack of education and formation, even of the people within

the tourism sector, in understanding how this investment will bring in greater value than the investment itself. P1 stated that there must be alignment with the demand as tourists nowadays are very careful and selective in the way they choose their holiday destination and accommodation package. With Malta offering the same products as Italy and Greece (sea and sun), the country needs to be competitive.

P3 stated that the Smart Hotel concept could open new markets or source a type of "tourists" who require more facilities rather than personal services. P3 mentioned the "Digital Nomads' phenomenon" and explained that this is a community of entrepreneurial expats, remote workers who are registered for employment abroad but opt to spend, for example, one year in Malta, or Greece, and use a concept called Co-living; though they typically seek higher living standards than a private room (workspace, pool, gym, BBQ area, etc.).

With regards to "sustainability readiness" and "IoT readiness", the participants admitted that the real challenge is not the infrastructures but the human aspect in taking decisions to implement the technology. For example, P2 stated that owners and hotel senior managers are hesitant to learn and invest in the latest technologies as they are comfortable with the current systems. Furthermore, even IT personnel are perceived by hotels, especially the small ones, as a big cost. To overcome this challenge, P1 stated that the MOT together with the MTA are evaluating the possibility of providing audits and consultancy services to businesses and tourism operators to assist them in identifying IT opportunities. On a positive note, P3 stated that recently stakeholders and investors (examples and names of hotels are given) stopped the licenses of their businesses or cancelled them altogether to demolish the hotels and rebuild them or refurbish them extensively.

To the question on what a Smart Hotel offers to the hospitality business, the MTA/MOT's representatives mentioned that it adds greater value to the tourist experience (P1); and for tourist niches opportunities (P3).

P1 said that the idea is that if, for example, a tourist has a good experience at the hotel using smart technologies, then the same experience is replicated across all areas and services of the Island during his journey. According to P1, the tourism product is made of an ecosystem of multiple stakeholders: restaurants, hotels, transport, etc. and the challenge is to educate all the people within the supply chain, as well as make the funds available for such formation. P1 stated that smart technologies must become the

mainstream, and the experience must become tourist centric; this would elevate Malta as a destination and would reflect in the tourist reviews.

To the question why hotels should invest in smartness and sustainability, P2 replied that the society has become dependent on technology and that the buyer behaviour has become environmentally conscious; customers for example expect to find separate waste bins in hotel rooms. In addition, P2 stated that nowadays there is an individual responsibility and a corporate one, in the sense that not only customers are demanding sustainable practices, but even employees,. According to P2 there are various elements which keep hotels from making IT investments, including reasons as time constraints since hotels typically do not have the time to make the research and see what financial incentives are available; as well as fear of change and uncertainty to implement something that is totally new on the market.

About the "Digital Island" concept and AI infusion, all MTA and MOT participants agreed and pointed out that the *Malta AI Strategy and Vision* document includes a dedicated chapter on how the MTA, the Malta Information Technology Agency (MITA) and a group of experts intend to create a good ecosystem of incentives and training systems for the tourism industry and the private sector stakeholders. They mentioned that substantial time and money is being invested on the project and that there will be dedicated meetings with the industry to see how AI and smart technologies can be suitable for them.

About "Green practices" in Malta, all the MTA and MOT's participants stated that there is generally a perceived increased awareness on sustainability amongst customers to the extent that this is also being reflected in the choices they make with regards to their holiday's package. However, they state that there are no indicators yet in place to measure the progress of the green initiatives and quantify the benefits. They explain that this is because in Malta, there are different types of accommodation categories (3-star, 4-star, 5-star hotels, guesthouses, hostels), and consequently the requirements for each sector are different. For this reason, they are contemplating to use international labels also locally and reward those accommodation suppliers that will apply for them with financial and marketing incentives.

With regards to licensing, the MTA and the MOT's interviewees confirmed that there is no category for Smart Hotels yet but they do not exclude that there could be a place for such initiative or label. They explain that the categorization and labelling system can be found in the subsidiary legislation 409.04.

To the question whether in Malta there are the conditions (mindset, infrastructures and knowledge) to introduce a Smart Hotel label, whilstP2 confirmed, they explained that currently there are many labels, and this is leading to confusion. P2 stated that they are currently working to reorganize the labels and establish the criteria; adding that, if the labelling is international and renowned worldwide, it is better because customers could easily relate to them; instead, if Malta comes up with its own labels, the people do not know what are the requirements and will not appreciate the value. All interviewees agreed that if a label had to be implemented, the criteria need to be clearly defined as well as a clear indication of what the Smart Hotel label will stand for.

When asked about Smart Hotel Indicators, according to P1 the indicators should not be limited specifically on smartness but should also focus on the quality aspect and include the ECO labelling, the digitalization labelling etc.

Chapter Five: Discussion

5.1. Introduction

This research study took a multi perspective approach to examine the level of understanding of smart technology applied to hotels and the hypothesis of introducing a label for Smart Hotels in Malta.
The purpose of the study was to explore the potential barriers and sources of resistance to the implementation of smart technologies in hotels in Malta and how IT applications can contribute progressively towards environmental sustainability. Six research questions were established:

Q.1 Is technology a significant factor that can impact the hotel's profitability for hoteliers to justify expenses and investments in their properties?
Q.2 How much is the impact of IoT systems effective on hotel's productivity?
Q.3 Will the introduction of AI influence the workforce and the employee's turnover?
Q.4 What barriers hoteliers face in implementing smart technologies?
Q.5 Which drivers influence whether a hotel adopts technology to pursue sustainability goals?
Q.6 Why should hotels in Malta become smart and focus on sustainable technology?

Through the surveys and the interviews, it was possible to obtain the stakeholders' perception on the six research questions. A comparison between the findings and the academic literature can be carried out to identify the gap between the academia and the stakeholders' perspective on Smart Hotels.

5.2. Discussion

Smart Hotel and Smart Technology

The definition of Smart Hotel stated by the hotel stakeholders during the interviews was a communal one; they all expected a Smart Hotel to be highly dependent on automation, AI and the IoT. Most of the respondents' approach about smart

technologies in hotels is customer-centric (in-room facilities designed to enhance and personalize the guest experience), employee-centric (improving working efficiency, whilst reducing workload and human errors), and revenue-centric (saving operational costs and increasing revenue). Nevertheless, none of the participants mentioned that the association with the term 'smart' could help to enhance their brand image and online reputation which will ultimately result in financial return, as previous research reported (Leung, 2019). In fact, if the marketing consultants package the product as "smart" or "high-tech", then the hotel can stand out among competitors as unique, as the guests will share their experiences on social media helping to promote the hotel as a Smart Hotel.

The research study clarified that currently there are no indicators yet for digitalization or use of smart technologies in hotels in Malta. Nevertheless, most of the participants believe that the introduction of a Smart Hotel would add value to the tourist experience, and, at the same time, it would elevate the hospitality industry offer and overall, Malta as a destination. One of the participants even suggested that such a business model could tap into tourist niches, such as the previously mentioned example of the digital nomads or people who look for total privacy and self-service (chap.4, para. 4.3.2.c). Though everybody agrees that the Smart Hotel has potential, the majority seem to agree that it should not fall among the existent hotel star rating (2-star, 3-star, 4-star or 5-star hotels) category but it could be an additional label or a sub-category (i.e., 3-star hotel with technology).

Generally, the study's findings demonstrated that technology investments and its appropriate use can be a significant data driver and a distinctive tool of market differentiator, increased sales, profitability, improved cost control and stock monitoring. However, what resulted from the interviews, is that hoteliers may find resistance from the owners as technology investments are costly. Hotel professionals are concerned about the ROI and the life span of the technology. As technology changes rapidly, they feel it is risky to spend a significant amount of money for something which may become outdated within a short period of time. Therefore, decision-makers and key people find it difficult to justify expenses and investment from the owners. What transpired from the interviews with Senior Management and IT suppliers is also a behavioural barrier and a close-minded attitude from the investors and owners' side, that can become a major challenge when implementing smart systems. There are instances when convincing the company's Chief Executive Officer

(CEO) or the Chief Financial Officer (CFO) that the system is valuable because it would speed up operations, is a time-consuming process. Therefore, the fact that the lag time between the technology expenditure and the payback can be lengthy constitutes a difficulty for hoteliers to invest in IT projects.

Half of the hotel Senior Managers did not seem to be familiar with the IoT Technology and the related benefits; this is proved by the fact that three hotel interviewees out of six said that they do not feature this type of technology in their hotels. The other three (one of which is an international hotel representative) are aware that IoT systems are effective on hotel's productivity through energy wastage control and resource optimization. The two local hotel interviewees are aware that the IoT could be a driving force towards sustainability thanks to IT interoperability which would increase control and improve the overall operational efficiency. On the contrary, all IT suppliers said that there is a tremendous gain in productivity when implementing smart technologies. They highlighted that there are systems that could benefit the guests, the employees, and the owners, placing emphasis on how they would increase customer satisfaction and, at the same time, staff, and operational efficiency. As mentioned in the literature review (chap.2, para.2), IT suppliers outline that IoT solutions can also help from a sustainable point of view thanks to sensors and access points that allow for the exchange of data and provide the management with information such as restaurant occupancy at a specific time, energy consumption per fixture and therefore, establish patterns, analyse demand, and optimize energy consumption. When it comes to managerial implications, the study's results show that there is low awareness of IoT capabilities. While the hotel Senior Managers knew that IoT systems enable them to extract and process a substantial amount of data, they did not mention the potential of additional revenue, including cross-selling and enhanced selling opportunities besides the opportunity, especially for big hotel chains, to turn the personalized guest experience into a loyalty guest scheme. Big hotels in fact are more likely to be the early adopters whilst the midscale and economy hotels will follow suit.

In addition, nobody pointed out that IoT has become a "fashion trend". In fact, in modern society, IoT has made automation available in people's everyday life at home and, as a result, customers expect the same level of technology to be available in hotel rooms.

Nevertheless, as anticipated by the academics (please refer to chap.2 para. 2.3.2), the IT Companies confirmed that IoT systems bring along potential threats in security for

both guests and hotels. All IoT devices can be hacked, and server rooms can be accessed, if not adequately kept, causing data leakages with severe repercussions.

The limited knowledge and awareness about IoT and generally, smart technology, are what the IT vendors, the MTA, and the MOT's representatives agreed upon and that improvement in the communication between the IT suppliers and the hotel owners and senior managers is needed and can be bridged by providing training, seminars or consultancy services that could help in transforming these barriers into opportunities.

Prior studies have raised the potential employment dilemma, with the introduction of AI robots into the workplace, which may psychologically damage employees to the extent that they feel undervalued and unappreciated and therefore, lose motivation and change their careers (Li *et al*., 2019). Therefore, in consideration of this, one of the research questions of this study was to explore the awareness on AI and whether the introduction of AI at the workplace impacts the employees' turnover in hotels. Surprisingly, the study's findings demonstrate that the introduction of AI is mostly perceived as a strength rather than a weakness. The results show that participants look at AI as a support tool on the job, in different forms such as better communication (clarity and concision), more analytics (increased accuracy and consistency), interpersonal skills (improved engagement with guests), and time management (increased effectiveness and efficiency). There is general understanding among hotel stakeholders that AI streamlines processes, accelerates tasks, and helps create more personalized and memorable experiences. On the contrary, when AI is associated with robotics technology, it is perceived as a weakness, since participants highlighted that hospitality is based on human interaction and that humans' soft skills can hardly be automated or replaced by robots.

The qualitative research design touched on the human resources' element. Firstly, looking at the current staff shortages in catering and hospitality and the necessity of keeping the employees motivated, and secondly, at the fact that hotels are recently attracting a young workforce that is more accustomed to technology; because they use it heavily in their private life, and there is thus more eagerness to use it also in their working environment. Therefore, according to this study's findings the introduction of AI is not seen as labour-replacement to the extent of affecting the employees' turnover.

According to academia, the barriers to the implementation of smart technology and IT projects, can occur at three different stages: at industry stage, at property stage and at project stage (Stewart *et al*., 2004). Based on the findings, the barriers identified at

industry level include low level of IT awareness, high costs, and poor interoperability. The barriers identified at property level include conservative behaviours, the ROI duration and estimation, property size and nature, and lack of IT guidance. At project level, the barriers are time constraints, cyber security, and privacy issues, as well as fear of change.

Similarly, to Nambisan and Wang (2000) who categorize the knowledge barriers into three groups, the researcher could identify four sub-categories for the low level in IT knowledge that is repeatedly mentioned by the study's participants:

- the lack of knowledge about IT infrastructures such as hardware and software, smart features;
- the lack of knowledge about the financial and human resources required to make technology developments and processes;
- the lack of knowledge regarding the ultimate business value of the technology, the business competitive goals that technology will help to achieve, the possibility of integrating the new IT applications with the existing ones, and the key strategies to deploy the technology; and
- the lack of knowledge regarding technology's potential to be a driver for sustainability.

The findings reveal that one of the biggest issues, which did not result from the academic literature, is that the collaborative approach and behaviour of the hotel stakeholders and investors are highly dependent on the local environment and country. Several participants highlighted that, in order to invest in IT infrastructures and, hypothetically, in Smart Hotels, the surroundings' infrastructures need to be as smart. However, while the survey respondents generally see the smart technology advances in hospitality positively, the majority disagree that Malta is a sustainable and innovative country. On the contrary, in agreeing that Malta is a Smart Destination, the Malta Tourism Authority (MTA) and the Minister of Tourism (MOT), zoom out from the hospitality industry and look at the bigger picture of the Tourism Industry. Initiatives such as the Digital Tourism Platform, the VisitMalta App, the first 3D Virtual Citizen, 'Marija', prove that Malta is mobilizing towards digitalization. Nevertheless, they also admit that a lot still needs to be done to replicate in smaller scale the same services and experiences within the entire chain supply.

The fact that buildings may not be "ready" to receive the new technology was also anticipated by previous studies as a threat; even though from the research study it was

not raised as a challenge and, when asked whether it could represent one, it resulted that both IT vendors and hotel stakeholders are well aware of the "retro-fit" technique that, even though costly, can adapt the old architecture to the modern IT requirements. Even the resistance to change, which was identified by the academics as an important factor in the success or failure of an IT project, does not constitute a threat from the study's results. It appears that the correlation between the employees and the technology is transforming from a negative attitude to a positive one associated with change and innovation. As a matter of fact, five out of six interviewees mentioned having a young workforce. This may also be a consequence of the latest events which may have triggered older employees to shift to other businesses and younger employees to enter the hospitality industry.

Smart Hotel and Sustainability

A growing number of studies are focusing on the necessity for the tourism and the hospitality industry to transition to smarter and more sustainable accommodations and practices. This is becoming imperative especially for hotels that are big energy consumers and carbon emissions producers (Warren *et al*., 2018). However, this "urgency" did not transpire in the study findings, even though overall the public, and the hotel professionals agreed that hotels should encourage "green practices", practicing smart ways to reduce energy and water consumption, minimizing the carbon footprint, reducing the use of papers, etc. When the decision-makers in the business were asked what are the drivers that influence hotels to adopt technology to pursue sustainability goals, the replies were inconsistent. This shows that there is insufficient guidance on what sustainable initiatives hotels can take to reduce their impact on the environment, both in relation to guests and staff behaviours. Only Holding D (part of Company Z) among the properties analysed, is actively persuading guests and employees to be socially sustainable and eco-friendly to the extent that one of their Senior Managers was appointed as "Sustainability Champion" and sustainability is indeed one of their core values. Having managerial roles with an environmental attitude, according to the academia, significantly improves a firm's environmental innovation progress (Long *et al*., 2017).

Another consideration was raised by the interviewee from overseas who suggested that sustainability should not be simply related to water and energy savings, but it englobes

other topics such as the Corporate Social Responsibility (CSR), the local economic growth, gender equality, and the general well-being. Recent studies have generated new insights about "social practices" (Warren *et al*., 2018) to understand people's behaviours and reactions when put in a different geographical context other than their house. Therefore, while many stakeholders claim to have a high level of environmental awareness and concern, this study's findings and the academia's studies indicate that, due to the lack of infrastructures (i.e., space for recycling facilities in their accommodation, permits, etc.) and lack of "know-how" (managerial commitment, value of green certifications, etc.) these are not being put into practice by most.

According to the academic literature, the hotel size is another driver for pursuing sustainable goals. This found confirmation in the study's findings. In fact, in case of big hotels, the cost is distributed across the international hotel network and the number of rooms, whereas in case of smaller or independent hotels, the cost is higher and unshared. Lastly, the potential of extending the business to new markets like North Europe or North America that are leaders in IoT investments.

The study's findings show a promising behaviour in the way that hotels in Malta are generally becoming more environmentally conscious and how they are slowly shifting their focus on smartness and sustainability. However, there seems to be a stereotype whereby sustainability is automatically associated and reduced to the infrastructures (wiring and piping systems, for example, to comply with modern energy saving solutions) and consequently, to high expenditures. Only one of the interviewees (overseas representative) pointed out that sustainability is broader than just climate change and environment. It is suggested that the guest sustainable consumption should be a holistic experience which can be extended to other areas of sustainability such as mobility, value chain, economic domestic growth, or food waste etc. As a matter of fact, academic studies prove that accommodations that rely purely on technologies gain initial savings but these are most likely not durable as the international tourist arrivals worldwide keep increasing (unwto.org, 2018, "2017 international tourism results: the highest in seven years"). Therefore, studies suggest that accommodation providers should consider offering "eco-technologies" or "eco-friendly amenities" (windows instead of Air Conditioning, reusable amenities, eco-friendly equipment, life routines practices, etc.). These pro-environmental amenities are an upgraded version of the pure technology-based approach, which will help achieve more sustainable outcomes whilst ensuring a sustainable production, consumption and

ultimately, conservation (Warren *et al*., 2018). In this regard, the study's participants agree that with Malta being a remote microstate in the Mediterranean, it is optimal that it becomes a "Smart, and Sustainable Island" as in the Malta Chamber's Economic Vision (independent.com, July 2021, "A smart, sustainable Island"). They all agree that the society has become dependent on technology and sensitive to environmental practices at the point that these are not only influencing the buyer's behaviour, but even employees are demanding welfare at the workplace. Therefore, smartness and sustainability are seen as "trends" and as the "future".

The representatives of the MTA reckon a number of small-medium hotels in Malta that cancelled their original license or demolished the old buildings and rebuilt them, or refurbished them extensively. In an interview to *Business Now* (2021) Reuben Xuereb, Chairman and CEO of leading design, engineering, and management firm, QP, stated that, although in Malta, a number of dilapidated fortifications and historical buildings were renovated and restored, when looking around though, one can still see a number of unfinished projects. He explains that in Malta there tends to be an attitude of saying "let's build it and then see"; therefore, the problem is that there is a tendency to begin a project without having a contingency plan in place for unexpected situations that may arise. This impacts tremendously the society and the environment (issuu.com, 2021, "Sustainable development is all about a balanced approach").

Nevertheless, the study reveals two major challenges for Malta to become a smart and sustainable country: one is that it requires that all branches of the tourism industry and government to be aligned and collaborate with the society in order to take a proactive role in educating the entire population and move forward to more quality and value in the private sectors and the hospitality industry; and the other challenge is that there are not yet any sustainability indicators to audit and measure the sustainability efforts and quantify the benefits.

Chapter Six: Conclusion

6.1. Conclusions

The Smart Hotel is a topic that has been discussed in academia over the past decade. Previous researchers have extensively explored the benefits of smart technology in hotels; however, these are generally regarded from the customer perspective and rarely from the stakeholder's perspective.

The adoption of smart technologies is pivotal for the hospitality business to remain competitive in today's market, especially given that differentiation is being driven by innovation and high customer expectations. Nowadays, the IT market, with the growing opportunities that this brings along, in terms of customer service and experience personalization, has become extremely accessible.

The study aimed to bridge the gap between the academic literature on smart technology and the hotel industry. It shed light on the use of technology to pursue sustainability goals in hotels which is also an aspect overlooked by most. It was possible to ascertain the level of understanding and knowledge of smart technology from the tourism and hospitality stakeholders' point of view, how effective it is in terms of profitability and productivity, and what are the challenges for implementation. The findings contributed to find theoretical explanation to the research questions:

- It assessed the level of understanding and knowledge on smart technology and the perceived perception of a potential Smart Hotel business model.
- It clearly showed that hoteliers find it difficult to justify expenses and IT investments in their properties as profitability cannot be measured within the short term.
- It indicated that IoT systems are effective on hotel's productivity and, even though there is low awareness among the hotel stakeholders, the interviewees showed interest in finding out what they are and how they can be drivers for smartness and sustainability.
- It clearly showed that AI is not regarded as a threat of employee's turnover.
- It contributed to identifying the main barriers to smart technology application.
- It revealed that the adoption of technology to pursue sustainability goals is an aspect which is overlooked, and any smart practice adoption is mainly due to marketing interests rather than to a real pro-environment concern.

- It presented the reasons why it is generally suggested that Malta should become a smart and sustainable island.

With regards to decision-making processes and management implications, after investigating the perspectives of key people within the hotels, IT suppliers and policy makers' representatives, the findings revealed that having a better communication and relationship between decision-makers and IT specialists, especially if outsourced, as well as explaining the benefits of the new systems and ensuring that there is interoperability, would contribute to overcome the resistance of owners and hotel stakeholders. Other strategies to overcome the mindset resistance include increasing awareness by means of providing consultancy services to Small-Medium Enterprises (SMEs) in the tourism sector for guidance about how to use the financial incentives and how to meet the sustainable goals; provide audits to measure smartness and sustainability "readiness" and identify weaknesses and opportunities to assist in the "digital and sustainable" transitioning; and organize Travel Tech conferences for technology applications to the hospitality industry to encourage collaboration with global IT companies, engage hotel professionals and stimulate brainstorming.

As we approach a new era, though in the post-pandemic scenario, the proposal of increasing smart technology to existent hotels and the hypothesis of a Smart Hotel category would be beneficial on three fronts:

- Firstly, by offering experiential services and contributing to the co-creation of experiences.
- Secondly, increasing the guest expectations with regards to digitalization, automation, and speed and by providing immersive experiences through AI Technology (wall maps and AR videos) in order to match the trends and the changes in travel and living brought by the pandemic.
- To elevate the quality of the experience in hotels and transition from a hotel room to a smarter and more sustainable accommodation that deploys technology to pursue sustainable competitive advantage.

The application of smart technologies in the hospitality business enhances the guest experience through the offer of more customer centric services. Moreover, it facilitates the service delivery, helps in designing an experiential service and contributes to the

co-creation of the experience, one where smart technology applications transform a consumer in a prosumer, who is an active participant in the experience. Experiential services strengthen the relationship between customers and the organization, increase loyalty, word-of-mouth and consequently create competitive advantage. Technology supports the employees in their tasks and creates new self-service features to facilitate both the front-stage interaction and the backstage processes. The ideal scenario would be to have an interface system, for each guest touchpoint, specifically designed to collect data and delight the customers. The data will be used to augment the customer perceived value (CPV) and to synchronize the interaction moments between the guest and the employees. This will increase the employee motivation, the perceived quality and the guest experience (Fisk *et al*., 2013).

The financial aspects related to introducing new technologies must also be considered. The hotel industry does not have the same budget allocation for innovative solutions as some other businesses have, due to its significant running expenses. For this, hotels need to work hard to provide tangible evidence on the benefits of the smart solutions such as added value and high customer experience to justify the return on investment. Convincing hoteliers that investing in smartness and sustainability is a good cause will be even harder if it requires them to fork out a substantial sum for new infrastructures. For this reason, technology needs to be gradually added in hotels. Overcoming change does not mean forcing hoteliers and entrepreneurs to adopt technology but it is about building a long-term relationship of trust between IT vendors and hoteliers. Only through close cooperation, will the hotel industry emerge among the fierce competitors and become leader in innovation.

The development of the "Customer Experience" concept is in line with the "Recover, Rethink and Revitalize" strategy in the *Digital RoadMap 2030* launched by the Maltese Government as it is perceived as long-lasting quality value (Recover), that creates a product which redefines the Malta experience (Rethink) and relates to innovation in the way that embodies the mindset shift of the way the tourism product is conceived (Revitalize).

The Smart Hotel business model though, because of its nature, does not focus on experiential service, but on the contrary, it provides a "private", "flexible" and "self-catering" experience which adds value in the accommodation offer. Seeing how

Maltese tourism is continuously growing, proven by the extended tourist season, a wide range of age groups and a diversified geographical source market, the accommodation offer should match the tourists' needs. The Smart Hotel business model is projected in a scenario that is witnessing the formation of numerous special interest travel niche markets like the Digital Nomads previously mentioned, or the Medical Tourism, the Sustainable Tourism (green), the Bleisure Tourism (business and leisure) and the proliferation, in variety and volume, of hosting services which respond to a wider set of tourist interests and demands throughout the year. This is causing hotels to lose share in favour of private accommodation. From this perspective, the belief that there will be a demand for the Smart Hotel proposal is realistic.

The study helped to derive several conclusions, one of which being that the adoption of smart technology is crucial to pursue sustainability in hotels. The smart service intervention can, not only streamline operations, increase revenue, and personalize the guest experience, but it can significantly contribute to reduce the environmental impact in the services, products, supplies, and even move forward to persuade guests to behave sustainably, by educating them to the eco-technologies and the "green practices". There are numerous steps that a hotel can take to become more sustainable; some of them are more costly such as the Heating, Ventilation, Air Conditioning (HVAC) system, but others are easier and cheaper to implement. For example, launching green initiatives such as "carpooling mobility" options or "cleaning up Malta" campaigns for guests and employees. As hotels are big wastage producers, such activities, besides conveying a powerful message of responsibility and awareness, show in practice the sustainability value. By involving guests in the initiative, they participate, to a certain extent, in the value of co-creation and this can have a profound impact on the experiential service delivery process. Such initiatives may entail the use of digital screens or web app for promotion, use of drones and satellite data to record the event and data, "green cars", etc.

Understandably a lot of what has been discussed and proposed may sound ambitious and unrealistic, though IT specialists, policy makers, hospitality operators appreciate the sense of urgency looking at the tourist behavioural trends and demands and at the power of smart technology. Therefore, studies like this, place emphasis on the necessity of adopting a transformative and reinventive approach as well as a holistic

and futuristic vision which is clear and shared equally by tourism and hospitality stakeholders.

6.2. Limitations

Beyond the theoretical implications, the study presents several limitations which could potentially be addressed in future research. First, the study does not include the contribution from a licensed Smart Hotel representative to be able to make a comparison and understand the strengths and weaknesses of this business model. In this regard, the researcher tried unsuccessfully to obtain an interview with a Smart Hotel in China, or Japan or in the United States; though possibly, exactly because of its nature, it was difficult to find the way to reach out to the Management. Secondly, even though the sampling is diversified, and a mixed methodology was used to reach out to a larger population, with the contribution of only five local interviewees within the hotel sector, the outcome cannot be generalized to all hotel stakeholders in Malta, the opinion it is set and relative to every individual hotel category. Secondly, the results depend on some variables such as the number of participants, the size of the company and its "smart" acquisition level. If the number of participants is low, the company size is small, and the hotels are relatively small, then the findings might not reflect the smart technology development trends in the ever-evolving IT market. In this regard, further studies are needed to capture the progress of smart technologies solutions' adoption, implementation and impact in the tourism and hospitality industry in Malta, in the coming years; especially since new smart technologies developments in the domains of metaverse, augmented reality and blockchain, may progress rapidly and extend the agenda for future research.

Moreover, as the findings are exclusively relative to Malta, future research may be expanded to include other countries in the Mediterranean to offer insights for comparison, especially since there are no Smart Hotels in Europe yet. Besides the limitations, the researcher is satisfied with the ample information received from all the participants and was able to conduct the study and raise awareness on the topic for further developments.

6.3. Recommendations

Smart technology can be a catalyst of change in the hospitality sector in the way the service is designed, delivered and experiences co-created between employees and guests, and equally shared between the guests and the companies.

The findings of the study clearly suggest that hotel businesses should tap into the emerging smart technologies and discover ways to implement them in their business strategy and operation structures to explore unconventional service settings and practices. In doing so, technology is not replacing the workforce but, on the contrary, acts as a stimulus to modernize the hotel sector and rather, make it more creative, dynamic, and less stagnant and standardized. Technology must be seen as a key tool to transform manpower-led processes into personalized experience processes. Therefore, the hypothesis of introducing a label for Smart Hotel and its potential, has crucial implications for the Maltese Tourism Industry as, not only would it increase competitive advantage, but it may reduce the interchangeability of the tourism product, by simply adding value to the guests' experiences and attractiveness to the employer for more motivated employees.

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Appendices

Appendix 1

Questions Survey 1

a. *Demographics*

In this section, you will be asked to provide some brief demographic information. Rest assured that this information cannot be used to identify you.

1. What is your gender?
2. What is your age?
3. How long have you been working in the Hospitality Industry?
4. Occupational Level
5. Educational Level

b. *Hotels and Smart Technology*

In this section, you will be asked to provide your opinion on 'how' and 'whether' the smart technology impacts the hotel's profitability. Please answer on a scale from 1-5, with 1 = Strongly disagree, 2 = Disagree, 3= Neutral, 4= Agree, 5 = Strongly Agree.

1. Do you have any idea of what the indicators of a 'Smart Hotel'?
2. Have you ever stayed or worked in a Smart Hotel?
3. Is Technology a major driver for change in the hospitality industry?
4. Do you believe that A.I. (Artificial Intelligence) applied to your job is a weakness or a strength?
   Please justify your answer.
5. Is Malta an ideal Country for nurturing digital innovations, smart technologies and artificial intelligence (A.I.)?
   Please justify your answer briefly.

c. *Efficiency & Productivity*

In this section, you will be asked to provide your opinion on 'how' and 'whether' the smart technology impacts the hotel's efficiency and productivity. Please answer on a scale from 1-5, with 1 = Strongly disagree, 2 = Disagree, 3= Neutral, 4= Agree, 5 = Strongly Agree.

6. Please indicate your level of agreement or disagreement for the following statements.
7. Do you know what a CRMS (Customer Relationship Management System) is?
8. Did you know that the CRMS (Customer Relationship Management System), by extracting the guest preferences, can assist the Front Desk Team in conducting targeted upselling and personalizing the guest experience?

d. *Human Resources*

In this section, you will be asked to provide your opinion on 'how' and 'whether' the smart technology impacts the employee's efficiency and productivity. Please answer on a scale from 1-5, with 1 = Strongly disagree, 2 = Disagree, 3= Neutral, 4= Agree, 5 = Strongly Agree.

9. Do you believe that cyber security and GDPR privacy risks (General Data Protection Regulation) associated with IoT (Internet of Things) represent a threat to implement smart technology in hotels?
10. The application of Smart Technology to the hotel operation could help the workforce become less 'manpower-led' and more 'manpower-lean'.
11. Do you perceive A.I. (Artificial Intelligence) as a threat or an opportunity for your job?
12. What are the reasons for your choice? (You can select more than one option).
13. The 'ease of use' and training on smart technology for employees is highly important.

14. Do you agree that the support and 'know-how' of the key people in decision-making and operational areas is important for the implementation of smart projects?
15. Can Technology raise productivity if applied to some departments such as Housekeeping and Front Desk?
    Please elaborate your answer.

e. Smart Hotels and Sustainability

In this section, you will be asked your opinion about the potential of the smart hotel business model to drive sustainability. Please answer on a scale from 1-5, with 1 = Strongly disagree, 2 = Disagree, 3= Neutral, 4= Agree, 5 = Strongly Agree.

16. Can Technology be a driving force to the hotel to become more sustainable?
17. Please indicate your level of agreement to the following statements.
18. Please elaborate below on how the use of Technology would benefit the employees and stakeholders.
19. Taking into consideration the post Covid-19 period and the consumption of tourism afterwards, how much would you agree with this statement: it is important to have a lean framework to achieve sustainable competitive advantage.
20. On a scale from 1-5, with 1 being likely and 5 being most likely, how important is it to be innovative in the hospitality industry?

Appendix 2

Questions Survey 2

a. *Demographics*

In this section, you will be asked to provide some brief demographic information. Rest assured that this information cannot be used to identify you.

1. What is your gender?
2. What is your age?
3. Occupational Level
4. Educational Level

b. *Hotels and Smart Technology*

In this section, you will be asked to provide your opinion on 'how' and 'whether' the smart technology impacts the hotel's profitability. Please answer on a scale from 1-5, with 1 = Strongly disagree, 2 = Disagree, 3= Neutral, 4= Agree, 5 = Strongly Agree.

5. What type of accomodation do you prefer to stay in during your holiday?
   5a. If you chose 'Hotels' please specify the Hotel Category.
6. Have you ever stayed in or heard about a Smart Hotel?
7. I know the indicators of a 'Smart Hotel'.
8. On a scale from 1-5, with 1 being less likely and 5 being most likely, how important is it to be innovative in the hospitality industry?
9. To what extent do you believe that Smart Technology helps hotels in terms of efficiency and productivity?
10. As a guest, do you believe that Smart Technologies (e-kiosks, keyless entry, contactless payment, chatbots, mobile check-in) will help you?
11. As a guest, do you believe that smart cameras with facial-recognition capabilities would improve your experience?

12. Do you believe that cyber security and GDPR privacy risks (General Data Protection Regulation) associated with IoT (Internet of Things) represent a threat to implement Smart Technology in hotels?
13. On a scale from 1-5, with 1 being less likely and 5 being most likely, how important is that technology is:
    13a. User-friendly
    13b. Easy-to-sustain
    13c. Effectively Integrated
    13d. Cost-Effective
    13e. Visible to the Customers

14. On a scale from 1-5, with 1 being less likely and 5 being most likely, how important are these features in Smart Hotels, for stakeholders and guests?
    14a. Improved levels of personalization
    14b. Easier access to Information
    14c. Operational Efficiency

15. Technology applied to hotels is beneficial for both guests and employees.
16. On a scale from 1-5, with 1 being less likely and 5 being most likely, how much would you agree that Technology reduces running costs – (e.g., labor costs)?
17. On a scale from 1-5, with 1 being less likely and 5 being most likely, how much would you agree that Technology gives competitive advantage?
18. On a scale from 1-5, with 1 being less likely and 5 being most likely, how much would you agree that Technology improves the quality of service in the firms (e.g., speed of service, personalization etc.).
19. On a scale from 1-5, with 1 being less likely and 5 being most likely, how much would you agree that Technology helps in service design?
20. On a scale from 1-5, with 1 being less likely and 5 being most likely, how much would you agree that Technology reduces wastage?
21. On a scale from 1-5, with 1 being less likely and 5 being most likely, how much would you agree that Technology makes monitoring stock easier and reduces human error?
22. On a scale from 1-5, with 1 being less likely and 5 being most likely, how much would you agree that Technology makes communication easier and cheaper?

c. Smart Hotels and Sustainability

In this section, you will be asked your opinion about the potential of the smart hotel business model to drive sustainability. Please answer on a scale from 1-5, with 1 = Strongly disagree, 2 = Disagree, 3= Neutral, 4= Agree, 5 = Strongly Agree.

23. Can Technology be a driving force for a hotel to become more sustainable?
24. How much would you agree with this statement: it is suggested for hotels to find ‘smart ways’ to be ‘green’ (reduce energy and water consumption, minimize the carbon footprint etc.)?
25. How much would you agree with this statement: Malta is a sustainable and innovative Country.

Appendix 3

Interview Questions to Hotel Senior Managers

I. General information

1) Could you briefly describe your hotel (size, workforce, type of clientele, facilities, room amenities)?

2) What distinguishes your hotel from other hotels in the area?

3) How did your hotel overcome the hurdles caused by the Covid-19 pandemic?

4) Do you have a long-term strategic plan? If yes, could you explain what your business strategy?

II. Smart Hotel

5) How would you define a Smart Hotel?

6) Do you consider your hotel as smart? If yes, why?

7) From your point of view, what are the indicators and the features of a Smart Hotel?

8) What can a Smart Hotel add to the hospitality business?

9) Do you have any plans to improve smartness and sustainability in your property? If yes, what are the benefits?

10) Do you use any smart applications? If yes, what type of applications?

11) Are you aware of the benefits of the application of the smart technology to the hospitality business in terms of efficiency and profitability? If yes, can you elaborate this further.

12) According to the academic research, for smart applications to lead to profitability, and consequently, to competitive advantage in hotels there is an important aspect that needs to be evaluated, which is analyzing the areas of focus of the IT investments and the associated issues. What is your decision-making process in IT expenditures? Do you seek input from different operational areas and management levels?

13) The smart technology is expensive and hotel management find it difficult to justify the expenditure without having a ROI (Return on Investment) estimation. How true is this?

14) What is the importance of A.I. (Artificial Intelligence) into the daily hotel operation? Does it affect the workforce during working hours and the employee's turnover?

15) Are there any barriers for the implementation of smart technology in your hotel? If yes, what are they?

16) Do you think that cyber security and GDPR privacy risks (General Data Protection Regulation) associated to the smart technology represent a real barrier to its implementation? In your opinion, more information and suitable guidelines would help in mitigating the risks?

III. Smart Hotels and Sustainability

17) How can IoT (Internet of Things) technology be a driving force towards sustainability?

18) How does smart technology help to achieve competitive sustainable goals?

19) In your opinion why hotels in Malta should focus on Smartness and sustainability?

20) Research shows that there exists a large gap between “sustainability readiness” and “IoT readiness”. Generally, hotels are aware about sustainability issues, but the buildings are not ready to implement the new IoT technology or the stakeholders are

hesitant to invest in it as they are in doubt about its financial benefit. Do you think this is applicable to Malta? If yes, could you elaborate your answer in detail?

Interview Questions to IT Suppliers

1) According to academic research, hotels are generally reluctant to deploy all IT capabilities compared to other businesses where the technology spreads at a fast pace. Is this true in Malta? If yes, why?
2) Evidence has proven that there is a limited technical understanding level in IT among most hotel decision makers that leads them to be skeptical about the value of investing in IT. Do you think this applies to Malta? How can this be overcome? Do you provide trial schemes or training for hotels to raise awareness and encourage them to implement IT technology?
3) What are the key issues that slow down ICT applications adoption in hotels as opposed to other industries?
4) The benefits of smart technology for hotel guests are well-known. Could you explain what would hotels stakeholders gain as in productivity terms when implementing smart technology in their properties?
5) What are the main challenges you experience to implement for instance IoT (Internet of Things)?
6) Do you think that the buildings are 'ready' to implement the new technology? Either yes or no, explain.
7) In your opinion, are there conditions (mindset, infrastructure, knowledge, etc) in Malta to introduce a label for 'Smart Hotels' category? If yes, why. If not, why.

Interview Questions to Malta Tourism Authority and Minister of Tourism Representatives

1) In your opinion, what are the indicators that qualify a hotel as "smart"?
2) Do you consider Malta as a smart destination? If yes, why?
3) Do you think that Malta's ecosystem is ready to have "Smart Hotels"?
4) Research shows that there exists a large gap between "sustainability readiness" and "IoT readiness". Generally, hotels are aware about sustainability issues, but the buildings are not ready to implement the new IoT technology or the stakeholders are hesitant to invest in it as they are in doubt about its financial benefit. Is this applicable to Malta? If so, could you elaborate your answer in detail?
5) What can a Smart Hotel add to the hospitality business?
6) The Ministry for Tourism with MTA (Malta Tourism Authority), MITA (Malta Information Technology Agency) and a group of experts commissioned the Digital Platform which is part of *Malta AI Strategy and Vision* for the period 2021-2030 and aims at transforming Malta into a "Digital Island" and infuse A.I. in all segments of the Maltese society. In your opinion, will MTA with the Government be keen to provide private investments into the hospitality business by ways of offering support measures and incentives to organizations to encourage the implementation of A.I. solutions and to test them?
7) Studies found that the adoption of "green practices" is a topic of interest to customers to the extent that they take it into consideration when choosing the hotel for their vacation. In your opinion, are hotels in Malta engaging sufficiently in sustainability initiatives to address environmental issues? If yes, could you elaborate your answer?
8) How many hotel 'categories' exist in Malta? Is the 'Smart Hotel' category one of them?
9) Are you planning to include a label for 'Smart Hotel'? If yes, what would be the indicators?

Appendix 4

Consent Form Hotel Senior Manager

Participant's Consent Form – Hotel Director / IT Personnel / MTA Director

The Smart hotel: A contactless and digital journey towards sustainability in Malta.

I, the undersigned, give my consent to take part in the study conducted by Patrizia Negro. This consent form specifies the terms of my participation in this research study.

1. I have been given written and verbal information about the purpose of the study; I have had the opportunity to ask questions and any questions that I had were answered fully and to my satisfaction.
2. I also understand that I am free to accept to participate, or to refuse or stop participation at any time without giving any reason and without any penalty. Should I choose to participate, I may choose to decline to answer any questions asked. IF I choose to withdraw from the study, any data collected from me will be erased anonymously.
3. I understand that I have been invited to participate in face-to-face or online interviews where the researcher will ask questions about the indicators of a smart hotel, "how" the smart technology can impact the hotel's profitability and "what" is preventing stakeholders to implement it. The researcher will investigate the potential of this new business model in the hospitality industry in Malta. I understand that the interview may take approximately 1 hour and 30 minutes. I understand that the interview is to be conducted in a place and at a time that is convenient for me.
4. I understand that my participation does not entail any known or anticipated risk.
5. I understand that *there are the following direct benefits to me*: I will be contributing to the research project to try and introduce a label in Malta for "Smart Hotel" and progress towards sustainability.
6. I understand that, under the General Data Protection Regulation (GDPR) and national legislation, I have the right to access, rectify, and where applicable, ask for the data concerning me to be erased.
7. I understand that all data collected will be stored in an anonymised form on completion of the study.
8. I have been provided with a copy of the information letter and understand that I will also be given a copy of this consent form.
9. I am aware that, if I give my consent, the interview may be audio recorded and converted to text.

I have read and understood the above statements and agree to participate in this study.

Name of participant: [redacted]

Signature: _____

Date: 8.4.2022

Patrizia Negro

Patrizia Negro
patrizia.negro001@its.edu.mt

Dr. Viana Hassan
viana24@hotmail.com

Consent Form IT Supplier

nsent Form – Hotel Director / IT Personnel / MTA Director

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nsent form.
are that, if I give my consent, the interview may be audio recorded and converted to text.

ead and understood the above statements and agree to participate in this study.

Name of participant: [redacted]
Signature: _____
Date: 24/02/2022

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.negro001@its.edu.mt

Dr. Viana Hassan
viana24@hotmail.com

Consent Form Malta Tourism Authority and Minister of Tourism Representative

Participant's Consent Form – Hotel Director / IT Personnel / MTA Director

The Smart hotel: A contactless and digital journey towards sustainability in Malta.

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9. I am aware that, if I give my consent, the interview may be audio recorded and converted to text.

I have read and understood the above statements and agree to participate in this study.

Name of participant: [redacted]

Signature: _____

Date: 15/03/2022

Patrizia Negro

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Appendix 5

Glossary Technical Terminology

Internet of Things (IoT) – IoT are multiple devices that when connected to a network allow the systems to create analytics and data which can be used for a number of initiatives and business opportunities.

Artificial Intelligence (A.I.) – A.I. through a system of algorithms simulates human intelligence to allow computer systems to instantly acquire knowledge from experience and perform human-like tasks to increase efficiency in the daily tasks. A.I. is widely used within all kinds of businesses for security, sales, marketing etc.

Information and Communication Technology (ICT) – is the hardware and software infrastructure (websites, blogs, emails, etc., radios, televisions, webcasting technologies etc. mobiles, satellite, video-players and video-conferencing etc.) that combined allow businesses and people to interact digitally.

Blockchain Technology - it is a decentralized ledger of all transactions across a peer-to-peer network. This technology allows businesses and people to make political and financial transactions (fund transfers, trades settlements, voting etc.) without the need of a central clearing authority.

Metaverse Technology – is a visual and imaginary iteration of the virtual space with reliability features to allow people to work, play, shop and even socialize without the need to be physically present but only "digitally" present "in" the internet.

Augmented Reality (AR) / Virtual Reality (VR) – technologies that simulate the real-life environment to create a "live-feel" moment without being physically present on the scene. The main difference between the AR and VR is that the virtual reality implies a complete immersion into the digital experience and the outside world is completely blocked to reproduce the actual feeling of being on the playing scene.

Immersive Experience - it refers to experiencing a destination or a place through engaging in various activities like eating, touring, learning about local crafts, like a local. Technologies like AR and VR enable people to get a taste of what their holiday will be like before going.

Bleisure Tourism – is the combination of the words "business" and "leisure" and refers to travelers who combine business and leisure trips in one.

Experiential service – is a service whose focus is on the customer experience and the engagement between the guests and the employees rather than on simply delivering a service.

Smart Hotel – the smart hotel business model refers to the integration of a network of features and systems that are interoperable and interconnected to streamline and automate daily tasks and add environmental value to the Organization.